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# MOBILE ENERGY LABORATORY
# ENERGY-EFFICIENCY TESTING PROGRAMS

## SEMIANNUAL REPORT:
## OCTOBER 1, 1990, THROUGH MARCH 31, 1991

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CONTENTS

## 1.0 EXECUTIVE SUMMARY

This report summarizes energy-efficiency testing activities applying the Mobile Energy Laboratory (MEL) testing capabilities during the first and second quarters of fiscal year (FY) 1991. The MELs, developed by the U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP), are administered by Pacific Northwest Laboratory (PNL)[a] and the Naval Energy and Environmental Support Activity (NEESA) for energy testing and energy conservation program support functions at federal facilities. The using agencies principally fund MEL applications, while DOE/FEMP funds program administration and capability enhancement activities.

This report fulfills the requirements established in Section 8 of the ***MEL Use Plan*** (PNL-6861) for semiannual reporting on energy-efficiency testing activities using the MEL capabilities. The MEL Use Committee, formally established in 1989, developed the ***MEL Use Plan*** and meets semiannually to establish priorities for energy-efficient testing applications using the MEL capabilities. The MEL Use Committee is composed of one representative each of the U.S. Department of Energy, U.S. Army, U.S. Air Force, U.S. Navy, and other federal agencies.

### 1.1 MANAGEMENT ACTIVITIES

The semiannual meeting of the MEL Use Committee was held October 24-25, 1990, in Chicago, Illinois. Among the key issues discussed were revisions to the ***MEL Use Plan***, the potential for MEL applications within other Army and Air Force commands, approval of new equipment purchases, and the current status of MEL activities for the Army Forces Command (FORSCOM).

PNL followed up on requests received last reporting pericd for possible MEL applications from the Lake City Army Ammunition Plant, Independence, Missouri (Army Materiel Command [AMC]); the Department of Transportation-Urban Mass Transit Authority, Chicago; and the U.S. Department of Agriculture/U.S. Forest Service, Washington D.C. In addition, PNL received two inquiries regarding MEL capabilities and applications. These were from Susan Debelle of the Western Area Power Authority (Golden, Colorado) and Tom Beyer of Battelle Memorial Institute (Columbus, Ohio). Both inquiries focused on MEL testing applications for use in utility program verification of energy-efficiency technologies. Each inquiry was followed up with summary information and capabilities statements.

The FORSCOM MEL activities are supported by Tim Thomas *(404) 362-3157* and Adrian Gillespie *(404) 362-7163* at FORSCOM. Mr. Thomas and Mr. Gillespie took over the FORSCOM program from Mr. Jim Vasiloff, who retired at the end of November 1990. During the reporting period, the day-to-day technical management and review activities of the FORSCOM project are managed for FORSCOM by the Savannah District Corps of Engineers (SAS). In November 1990,

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[a] Pacific Northwest Laboratory is operated by Battelle Memorial Institute for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830.

a signed project order from FORSCOM was received by DOE and PNL in the amount of $1.2 million for continuing MEL activities at FORSCOM sites.

In October 1990, ***Pacific Northwest Laboratory Appraisal Report*** forms were mailed to personnel at nine sites for evaluating site visit, testing, and technical assistance activities being conducted by PNL as part of the FORSCOM work.

## 1.2 SITE TESTING AND RELATED ACTIVITIES

During the reporting period, five MEL Assignment Plans (MAPs) were prepared identifying testing to be undertaken at the Lake City Army Ammunition Plant and Marine Corps Base Camp Pendleton. Over 19 tests were completed at six FORSCOM sites (Forts Lewis, Sam Houston, Irwin, Stewart, Ord, and Hunter Army Air Field), one Army Materiel Command site (Lake City Army Ammunition Plant), seven U.S. Navy sites (Naval Air Depot Pensacola, Lakehurst Naval Air Station, Naval Station San Diego, Public Works Center Norfolk, Marine Corps Base Barstow, Public Works Center Guam, National Naval Medical Center), one Department of Transportation site (Merchant Marine Academy), and one DOE site (Hanford).

Significant activities at these sites during this reporting period include

- conducting in-situ chiller performance evaluation at *Fort Sam Houston* and *Hunter Army Air Field*
- completing a baseline of electrical usage in 14 buildings and the central plant at the *National Naval Medical Center* and three buildings and two central boilers at the *Merchant Marine Academy* to ascertain the potential for shared energy savings projects at these sites
- completing the electric energy baseline and efficiency resource assessment at *Fort Lewis* to support the continuing development of the model program to allow the serving utility to purchase energy conservation resources from the site through installation of energy-efficient technologies
- initiating a survey and evaluation of manufacturers of automated meter-reading equipment to identify the best technologies for potential application at *Fort Carson* and other Department of Defense (DoD) sites
- undertaking a heating plant modifications study at the *Naval Underwater Systems Center* and evaluating the potential for dual fuel operations
- initiating several projects at the *Department of Energy's Hanford Site* including personal computer and associated auxiliary equipment energy usage study, electrical metering of buildings and chillers, and metering of lighting and energy usage at the Federal Building
- evaluating load-shedding options and thermal storage feasibility, and upgrading boilers and distribution systems at several *U.S. Navy* sites.

A project was initiated in February 1991 to link Fort Drum with a tailored demand-side program by the serving utility, Niagara Mohawk, developed specifically for its federal customers. This program is similar to the program developed for Fort Lewis and would be applied at up to four federal sites in the Niagara Mohawk service territory. This model program would systematically evaluate all potential energy savings opportunities at the site and allow the site to take advantage of technologies offered by the utility.

## 1.3 SIGNIFICANT TEST FINDINGS

Significant findings from the testing activity during the reporting period are as follows:

- Results from testing compressors at *Fort Carson* indicate that the replacement air compressors are approximately 9% more energy-efficient than the old compressor, resulting in an annual savings of about $10,000 over the lifetime of the compressors. However, there appears to be significant leakage in the air distribution system, causing higher loading on the compressors. This has resulted in increased energy usage for a fairly constant demand for compressed air during the monitoring period. The energy and demand cost savings from improvements in the distribution system would be approximately $2350/year.

- The commissary at *Fort Lewis* used electrical power at the rate of 390 kWh/day during the test period. This corresponds of an energy use intensity (EUI) of 49 KWh/ft$^2$-yr. The EUI results indicated that the commissary is a relatively efficient energy user compared to similar buildings monitored by PNL in the region.

- The pump motors on the sewage treatment plant tested at *Fort Lewis* appeared to be operating satisfactorily. However, there appeared to be a persistent phase imbalance, caused primarily by excessive current in the C phase. This is the likely cause of the frequent "trip-out" being experienced.

- Because of the shape of the curves for the individual feeders metered at the *Fort Stewart* substation, there appear to be few opportunities for load shedding or peak shaving. The most promising opportunities for saving energy appear to be in installation of energy conservation measures such as high-efficiency lights and insulation.

- From the monitoring data in Building 200 at *Fort McPherson*, it is apparent that the building has a significant overnight and weekend "base" load. This is likely due to the high loading and usage of computing equipment and heating, ventilating, and air-conditioning (HVAC) system operation. Because of this factor, the EUI is 70% to 200% greater compared to buildings of similar size and type, depending upon the season. Suggested areas for saving energy in the building include installing energy-efficient lighting, adjusting nighttime thermostat set points, and reducing ventilation rates

during nonworking hours in those areas of the building that are not occupied.

- The energy use baseline assessment at the *National Naval Medical Center* provided sufficient data to recommend probable shared energy savings (SES) projects. The principal SES project opportunities identified are 1) retrofits to lighting systems, 2) thermal storage, and 3) gas-driven chillers.

- Detailed central boiler and whole-building operational and baseline data to support the procurement of energy improvements financed by a utility or SES contractor were provided to the *Merchant Marine Academy*. The electric usage in three large monitored buildings showed a baseline of 320 kVA and a daytime load of about 200 kVA above the baseload. Not only are there significant opportunities for high-efficiency lighting and controls retrofits in the buildings, but a significant fraction of the baseload likely consists of equipment that can be turned off at night and weekends. The two central boiler delivery efficiencies can be improved by retubing the boilers, preheating combustion air with a stack recovery heat exchanger, improving boiler and excess air trimming controls, and reducing steam pressure.

- Temperature and humidity control were evaluated for the *Lake City Army Ammunition Plant*. Current controllers proved to be accurate to within 2°F and were controlling to within 4°F. Several recommendations are made for further evaluation and improvement in the temperature and humidity control in the charging wings. This included replacing, or refurbishing and recalibrating, strip chart controllers/recorders in the charging area to give more accurate control for temperature and humidity; replacing controllers in the electronics laboratory; and reevaluating the temperature and humidity conditions under which operations need to be curtailed for product quality. Additional long-term monitoring of temperature was recommended to better characterize the operating conditions.

- An assessment of thermal energy storage feasibility for the *Public Works Center (PWC) Norfolk* was completed by NEESA. A load-shedding assessment was also completed. A load-shedding system would use radio-controlled switches to shed air conditioning loads during peak electrical consumption periods.

- The results of the *Fort Lewis* electrical energy assessment indicate that approximately 40 million kWh/yr of efficiency resource are available at a cost of less than $0.03/kWh. A partnership project is expected, with 85% of the costs of the technologies to be provided by the utility. These technologies would reduce the site's annual electricity bill by nearly $750,000. The work is continuing in the third quarter of FY91 with the nonelectric assessment and continued negotiations between the site and the utility.

## 1.4 EQUIPMENT

Richard Szydlowski of PNL met with Richard Rundus and Lee Edgar of the U.S. Army Corps of Engineers Construction Engineering Research Laboratory (CERL) in October 1990, to discuss automatic meter reading (AMR) projects. Jim Heller from NEESA also attended the meeting. CERL has several ongoing AMR activities, primarily in family housing, that could be applicable to the AMR project being undertaken for FORSCOM at Fort Carson.

The capability to measure hot water flow in the form of steam system condensate return was developed and proven out in testing at Fort Lewis. The flow measuring and signal conditioning equipment was searched out and custom-ordered to accomplish this task. Hardware was procured with the remainder of the FY90 FEMP equipment funds. This gives the MEL an additional capability, primarily for situations where direct measurement of steam flow is impossible.

Major equipment purchased and received during the reporting period includes

- two portable computers and software
- data collection computer and software
- 100-MB hard drive
- two multisync three-dimensional monitors
- facsimile/data modem
- two laser printers and two portable printers
- two cellular telephones and compatible modems
- electromatic ultrasonic thickness gauge
- pressure calibration system
- Solomat Solopac Plus
- halogen leak detector
- combustion analyzer
- two Synergistics Control Systems C180 data loggers
- 12 large current transformers
- eight paddlewheel flow meters and signal conditioning
- positive displacement fuel oil flow meter
- high-quality light meter
- label printer.

## 1.5 REPORTING

Four test reports were completed, reviewed, and submitted to the site this reporting period. These were

- Final Test Report FTMAC-003-90/10/19 ***Combustion Efficiency of 10 Small Boilers***

- Final Test Report FTMAC-001-90/10/30 ***Boiler Combustion/Delivery Efficiency***

- Final Test Report LEWIS-005-90/10/30 ***Commissary Electric Profile***

- Final Test Report for Lake City Army Ammunition Plant *Temperature/Humidity Study in Buildings #3 and #65 Charging Wings.*

Four test reports were drafted and submitted for review. These were

- Draft Test Report CARSON-003-91/03/20 ***Building 8000 Air Compressor Replacement***
- Draft Test Report FTMAC-002-91/04/05 ***Building 200 ($C^2F$) Electrical Usage Evaluation***
- Draft Test Report STWRT-001-R1-91/04/12 ***Electric Substation Monitoring***
- Draft Test Report LEWIS-003-91/04/15 ***Sewage Effluent Pump Analysis.***

In addition, the following significant documents and reports were prepared during the reporting period:

- ***Feasibility Analysis for a Shared Energy Savings Lighting Retrofit at Ft. McPherson***
- ***Ft. Lewis Electric Energy Baseline and Efficiency Resource Assessment***
- ***Energy Use Baselining Study for the National Naval Medical Center***
- ***U.S. Maritime Administration Merchant Marine Academy Monitoring to Support a Shared Energy Savings Procurement.***

## 2.0 PROGRAM DESCRIPTION

The U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP) Office provides leadership and assistance to federal agencies on energy management issues. Because much of the federal infrastructure is old and was built when energy was of relatively low value and cost, it now presents tremendous challenges and opportunities for energy-efficiency improvement. FEMP has developed this unique program of technical support and guidance to assist federal agencies in identifying and implementing cost-effective energy-saving projects.

### 2.1 SCOPE

Mobile Energy Laboratories are deployed for on-site evaluation of energy use efficiency. Energy use metering and analysis equipment is provided to test the efficiency of energy conversion and distribution systems, as well as end-use applications. Specific test procedures are being developed for common investigations. Trained engineers and specialists conduct tests with the assistance of host facility staff and contractors.

Reports are produced to describe the testing, test results, and suggested courses of action. These reports can be used to justify changes in operating procedures, maintenance efforts, system designs, or energy-using equipment. The MEL capabilities are instrumental in the identification and acquisition of energy efficiency at federal facilities, primarily as part of utility-federal partnership demand-side management programs. The MEL capabilities are also used to evaluate and verify the results of energy efficiency and load management projects instituted at a facility.

### 2.2 ORGANIZATION

The ***MEL Use Plan*** (PNL-6861) recognizes the need for, and advantages of, centralized administration, test procedure development, and enhancement of the MEL program. DOE provides new equipment and upgrades existing equipment as new capabilities are developed. The equipment, engineers, and specialists are made available to federal agencies and facilities who provide funding for the direct costs associated with MEL applications.

Pacific Northwest Laboratory (PNL) and the Naval Energy and Environmental Support Activity (NEESA) are jointly responsible for MEL enhancement, equipment calibration, test procedure development, testing, and overall management and reporting requirements for applying the MELs. Both PNL and NEESA work with the MEL Use Committee to coordinate assignments of MELs with federal agencies.

## 3.0 MANAGEMENT ACTIVITIES

In 1988, DOE assigned PNL responsibility for MEL administration and management to better coordinate and enhance MEL applications for most of the federal agencies not served by NEESA. Alternatively, NEESA serves primarily testing activities as required for the U.S. Navy, and has been doing so under the MEL program since 1985.

### 3.1 MEL USE COMMITTEE AND FEMP SUPPORT ACTIVITIES

The semiannual meeting of the MEL Use Committee was held October 24-25, 1990, in Chicago, Illinois. Among the key issues discussed were revisions to the ***MEL Use Plan***, promotion of MEL within other Army and Air Force commands, approval of new equipment purchases, and the current status of MEL activities for FORSCOM. In general, the meeting provided ample opportunity for programmatic and technical exchange of information. The minutes from the meeting are given in Attachment 1.

Final arrangements were made for the semiannual MEL Use Committee meeting to be held April 2-3 in Orlando, Florida. Representatives from the Army (FORCES Command), Air Force (Air Force Logistic Center), Navy (NEESA), DOE (Fermi Laboratory), FEMP, and PNL are scheduled to attend. The final revisions were made to the ***MEL Use Plan,*** and the document was prepared for signoff by the MEL Use Committee members. A list of suggested equipment for the MEL to be purchased by PNL with $37,500 of FY 91 FEMP funds was prepared and will be discussed at the meeting.

The semiannual report, ***Energy-Efficiency Testing Activities of the Mobile Energy Laboratory*** (PNL-7652), was published and distributed in March 1990. The report documented activities during the period extending from April 1, 1990, through September 30, 1990.

PNL followed up on requests received last reporting period for possible MEL applications from the Lake City Army Ammunition Plant, Independence, Missouri (Army Materiel Command); the Department of Transportation-Urban Mass Transit Authority, Chicago; and the U.S. Department of Agriculture/U.S. Forest Service, Washington D.C.

Four MEL Assignment Plans were developed in November 1990 for energy systems testing activities at the Lake City Army Ammunition Plant. A meeting was held in November 1990 with the Department of Agriculture to assess the likelihood for energy-efficiency testing and utility demand-side management projects at the Forest Products Research Laboratory in Madison, Wisconsin. Discussions were held in January 1991 with the Urban Mass Transit Authority (Chicago) and the Department of Transportation (Washington, D.C.) to outline the potential testing activities, costs, and schedule.

Inquiries were received by PNL regarding MEL capabilities and applications. These were from the Western Area Power Authority (Golden, Colorado), Battelle Memorial Institute (Columbus, Ohio), and the Army Training and Doctorate Command (TRADOC). The inquiries focused on MEL testing applications for use in utility upgrades evaluation and utility demand-side

management program verification. Each inquiry was followed up with summary information and capabilities statements.

An article, "Measurements for Energy Efficiency Improvements Using the Mobile Energy Laboratories," was submitted for publication in the ***Energy Engineering Journal***. The article, authored by Graham Parker of PNL and Jim Heller of NEESA, gives an overview of the MEL program at PNL and NEESA, as well as examples of testing. The article, if accepted, would be published in the June/July 1991 edition of the journal.

## 3.2 FORCES COMMAND PROJECT MANAGEMENT ACTIVITIES

The Army Forces Command (FORSCOM) MEL activities are managed by Graham Parker at PNL (509) 375-3805 for Tim Thomas *(404) 362-3157* and Adrian Gillespie *(404) 362-7163* at FORSCOM. Mr. Thomas and Mr. Gillespie took over the FORSCOM program from Mr. Jim Vasiloff, who retired at the end of November 1990. During the reporting period, the day-to-day technical management and review activities of the FORSCOM project are managed for FORSCOM by the Savannah District Corps of Engineers (SAS).

In October 1990, *Pacific Northwest Laboratory Appraisal Report* forms were mailed to personnel at nine sites for evaluating site visit, testing, and technical assistance activities being conducted by PNL as part of the FORSCOM work. Once completed and returned to PNL, the results of the appraisal will enable PNL to more effectively serve the sites and FORSCOM in testing and related activities.

In November 1990, DOE and PNL received a signed project order from FORSCOM in the amount of $1.2 million for continuing MEL activities at FORSCOM sites.

In December 1990, at the request of FORSCOM, PNL prepared documentation for the FORSCOM Annual Report. This documentation focused on the testing activities and their actual and potential impact on the energy usage at each site.

Graham Parker and Bill Currie, Energy Systems Modernization Office (ESMO), PNL, met with SAS staff and FORSCOM staff in January 1991 to discuss an anticipated reorganization within FORSCOM energy office and what effect it would have on the current scope of work. Among the items discussed was the possibility of PNL undertaking additional activities for the sites including effecting operations and maintenance activities identified as part of the testing activities.

## 4.0 TESTING ACTIVITIES AND RESULTS

The current status of testing activities undertaken by PNL at federal facilities and installations is given in Attachment 2.

### 4.1 FORSCOM TESTING

#### 4.1.1 Fort Carson

An initial site visit was conducted at Fort Carson in January 1989. Testing activities were initiated in January 1989 and are continuing. The point of contact at Fort Carson is Steve Snyder *(719) 579-3678*.

##### 4.1.1.1 Testing and Reporting Activities

Metering equipment remained at the site for MAPs CARSON-001, CARSON-002, and CARSON-003. Data continued to be collected for CARSON-001 and CARSON-002, even though the test reports have been written.

The draft Test Report CARSON-003-91/03/20 ***Building 8000 Air Compressor Replacement*** was completed and submitted to SAS for review in March 1990. The test results indicate that the replacement air compressors are approximately 9% more energy efficient than the old compressor, resulting in an annual savings of about $10,000 over the lifetime of the compressors. However, there appears to be significant leakage in the air distribution system causing higher loading on the compressors. This has resulted in increased energy usage for a fairly constant demand for compressed air during the monitoring period. The energy and demand cost savings from improvements in the distribution system would be approximately $2350/yr.

##### 4.1.1.2 Other Activities

In October 1990, PNL met with Steve Snyder and his staff to discuss the site requirements for an automated meter reading (AMR) system. Three main goals of the system were 1) to be able to access base-wide electric demand profiles at two substations with the capability to expand to other utilities (e.g., gas, water), 2) to coordinate the reading of demand profiles with a demand-limiting or optimal start/stop control system, and 3) to expand the AMR to reimbursable accounts. The project has support from the Assistant Division Commander as well as possible co-funding from the site (excess funds from a utility contract renegotiation).

Site visits to manufacturers and utilities having AMR systems installed were scheduled for early May 1991. An information packet necessary for conducting a formal request for information of AMR equipment manufacturers was assembled and will be distributed to manufacturers and users in April 1991. A presentation of AMR system type, capability, and cost options will be provided to Fort Carson staff. A visit to the Air Force Academy is also planned to examine its AMR system in operation.

### 4.1.2 Fort Lewis

An initial site visit was conducted in May 1989, and testing was initiated in September 1989. Nine MAPs were prepared, and six were approved. Five tests have been completed. The point of contact for MEL testing activities at Fort Lewis is Jim Thayer *(206) 967-5237*.

#### 4.1.2.1 Testing and Reporting Activities

Test Report LEWIS-005-90/10/30 ***Commissary Electric Profile*** was reconfigured into the new test report format and sent to SAS in October 1990 for transmittal to the site. The commissary used electrical power at the rate of 390 kWh/day during the test period. This corresponds to an EUI of 49 KWh/ft$^2$-yr. The commissary EUI indicated that that building is a relatively efficient energy user compared to similar buildings monitored by PNL in the region.

Draft Test Report LEWIS-003-91/04/15 ***Sewage Effluent Pump Analysis*** was sent to SAS for review. The pump motors appeared to be operating satisfactorily. However, there appeared to be a persistent phase imbalance, caused primarily by excessive current in the C phase. This is the likely cause of the frequent "trip-out" being experienced.

The tests described in LEWIS-006-R1 and LEWIS-007-R1, expanded to an additional two building types, form the basis for the site testing to support the nonelectric energy efficiency assessment for the Federal Energy Decision Screening (FEDS) project at the site (see Section 5.0). Testing included four barracks buildings (with and without dining facilities), two motor pools, and two office buildings. Monitoring was successfully completed in March 1991, with data analysis scheduled for completion in mid-May 1991.

### 4.1.3 Fort Irwin

An initial site visit was conducted at Fort Irwin in September 1989, and three MAPs were developed and signed. Testing activities were initiated in December 1989, and all tests have been completed. The point of contact at the site is Linda Osborne *(619) 368-4347*.

#### 4.1.3.1 Testing and Reporting Activities

Activities during the reporting period focused on completing data collection and analysis for IRWIN-001 ***Electric Substation Monitoring*** and IRWIN-002 Office ***Building Electric Use Profile***.

### 4.1.4 Fort Sam Houston

An initial site visit was conducted at Fort Sam Houston in August 1989. Three MAPs were prepared and signed. Testing initiated in August 1989 is continuing. The point of contact at the site is Kaya Cibildak *(512) 221-0105*.

4.1.4.1 Testing and Reporting Activities

Chiller testing [FTSAMH-002] was conducted at the site in October 1990. In general, the three central chillers that were tested were operating at near-optimum efficiency.

Activity since October has focused on analysis of the chiller test data. Performance curves were obtained from the chiller manufacturer for the chiller in Building 902. Analysis has focused on comparing the measured coefficient of performance (COP) obtained during testing with the manufacturer's published COP at the conditions under which the chiller was tested.

4.1.5 Fort Stewart/Hunter Army Air Field (AAF)

An initial site visit was conducted at Fort Stewart and Hunter Army Air Field (AAF) in October 1989. Two MAPs each were prepared and approved for both Fort Stewart and Hunter AAF in January 1990. Testing was initiated in February 1990 and is continuing. The site contact at Hunter AAF is Jerry Bridgers *(912) 352-5427*. The site contact at Fort Stewart is Randy Jones *(912) 767-4798*.

4.1.5.1 Testing and Reporting Activities

Analysis of the chiller testing data [HUNTER-002] began in November 1990. Considerable problems with data collection using a dedicated computer at the site necessitated the termination of testing for HUNTR-001 (electrical distribution systems profile) in January 1991. The data were corrected using utility billing data for effect of voltage changes caused by a regulating auto-transformer. Sufficient data have been collected for analysis and writing the test report.

The draft Test Report STWRT-001-R1-91/04/12 ***Electric Substation Monitoring*** was completed and submitted to SAS for review. Because of the shape of the curves for the individual feeders at the site, there appear to be few opportunities for load shedding or peak shaving. The most promising opportunities for saving energy appear to be in installation of energy conservation measures such as high-efficiency lights and insulation.

Data collection continued for STWRT-002-R1. Because of the need to capture the peak cooling season for this test, the monitoring equipment for this test will remain in place and data will continue to be collected through August 1991.

Upon request, PNL supplied preliminary data to SAS on circuit loads at Hunter AAF substation [HUNTR-001]. The Corps needed the electric feeder electric demand profiles to determine where to attach a new major electric load without overloading a feeder.

4.1.6 Fort McPherson

An initial site visit was conducted at Fort McPherson in November 1989. Three MAPs were prepared and signed in December 1989. Testing activities were

initiated in January 1990 and were completed during the second quarter of FY91. The site contact is Deborah Rowell *(912) 752-2071*.

4.1.6.1 Testing and Reporting Activities

Test Report FTMAC-003-90/10/19 ***Combustion Efficiency of 10 Small Boilers*** was revised based on comments from SAS. FTMAC-001-90/10/30 ***Boiler Combustion/Delivery Efficiency*** was slightly modified. Both reports were sent to SAS for transmittal to the site. SAS reviewed Test Report FTMAC-003-90/10/19 and had no further comments. The report was forwarded to the installation in November 1990.

The draft Test Report FTMAC-002-91/04/05 ***Building 200 ($C^2F$) Electrical Usage Evaluation*** was submitted to SAS for review. From the data, it is apparent that the building has a significant overnight and weekend "base" load. This is likely due to the high loading and usage of computing equipment and HVAC system operation. Because of this factor, the EUI is 70% to 200% greater than that of buildings of similar size and type, depending upon the season. Suggested areas for saving energy in the building include installing energy-efficient lighting, adjusting nighttime thermostat set points, and reducing ventilation rates during nonworking hours in those areas of the building that are not occupied.

4.1.7 Fort Gillem

An initial site visit was conducted at Fort Gillem in November 1989. Two MAPs were prepared and signed in December 1989. Testing activities were initiated in January 1990 but not completed. The site contact is Deborah Rowell *(912) 752-2071*.

4.1.7.1 Testing and Reporting Activities

The limited DEH support available at this time resulted in deferral of testing for FTGIL-001 AND FTGIL-002 until such time that staff becomes available.

4.1.8 Fort Ord

An initial site visit was conducted at Fort Ord in April 1990. Five MAPs were prepared and signed in August 1990. Testing activities were initiated in December 1990 and are continuing. The site contact is Richard DuCoing Fuente *(408) 242-2052*.

4.1.8.1 Testing and Reporting Activities

The testing that began in December 1990 is summarized below.

- A C180 data logger was installed at the main switching station to monitor seven 12-kV feeder circuits and the main circuit of the substation [FTORD-003].

- Two C180 data loggers were installed at the hospital to desegregate the 277/408 equipment from the 120/208 loads and the emergency circuit from the normal circuit loads [FTORD-004].

- A boiler efficiency test was conducted by monitoring natural gas flow, feedwater flow, and combustion efficiency of the two hospital boilers at three firing rates. Energy conservation opportunities noted included the need to reduce controller gain under automatic control to stop oscillation; the need to downsize the burner; the need for inlet vanes to replace combustion air blower outlet damper; and the need for an additional, smaller feedwater pump to run alone under low steam demand conditions [FTORD-005].

Data continued to be collected for FTORD-003 and FTORD-004 during March. Data analysis continued for Test Report FTORD-005 (hospital end-use characterization). Because Fort Ord is likely to be listed by DoD for closure, no additional testing is anticipated at this site.

#### 4.1.8.2 Other Activities

Work was performed in October on the format for the base's gas usage database as part of a rate analysis performed by PNL. Contact was made with the utility (Pacific Gas and Electric Company [PG&E]) representative to discuss the approach and to try to expedite the data response. Sample electric usage data were obtained and examined to ensure suitability for the electric usage database.

Additional requests were made in November to PG&E for the site to obtain electric and gas usage data from its account database to continue the rate analysis. Hard copies of this data were also obtained from site records to fill in data gaps.

The utility billing data for the ongoing rate analysis appeared to suffer from a series of moderately serious gaps, and the gas usage data appeared to require some backfilling. Also, the length of time series is roughly 30% to 40% more abbreviated than expected. However, analysis continued with the interpretation of the electric and gas usage data from PG&E. Data were verified and missing observations noted. This activity is expected to be completed in the third quarter of FY91.

### 4.1.9 Fort Riley

An initial site visit was conducted at Fort Riley in July 1990. Three MAPs were prepared and signed by the site DEH in August 1990. The site contact is Steve Pientka *(913) 239-2371*.

#### 4.1.9.1 Testing and Reporting Activities

The three MAPs prepared for Fort Riley were signed by FORSCOM in October 1990. These were RILEY-001 ***Electrical Distribution System Profile***; RILEY-002 ***Chiller Delivery Efficiency***: and RILEY-003 ***Chiller Cooling Load Determination***. Testing activity was scheduled for the third quarter of FY91.

#### 4.1.9.2 Other Activity

In January, PNL undertook a review of an electrical distribution study prepared by an architect/engineer under subcontract to the site. The primary purpose of this review was to ascertain whether additional testing of the electrical distribution system was warranted. (A MAP for this test has been prepared [RILEY-001]). The analysis performed by the subcontractor was generally sound, although lacking in certain empirical data. It was therefore concluded that additional testing of the electrical distribution system would not be cost-effective. Thus, such testing was not included in the testing budget for the site.

## 4.2 OTHER FEDERAL FACILITIES TESTING

Testing conducted by PNL at other federal facilities and installations is summarized below.

### 4.2.1 DOE Forrestal Building

PNL has been requested to assist DOE in developing an SES solicitation for relighting the building as well as preparing a testing/metering procedure to evaluate proposed relighting strategies in a pilot demonstration in one of the offices of the Forrestal Building. The demonstration and evaluation of lighting retrofit technologies are scheduled for the third quarter of FY91.

*[The DOE contact for this work is Terry Radigan, FEMP (202) 586-6746.]*

### 4.2.2 National Naval Medical Center (NNMC)

PNL is providing engineering and other services to collect energy engineering and support data for the development of SES project baselines appropriate for Navy procurement action at the NNMC in Bethesda, Maryland. This includes on-site surveys of 14 buildings to collect characteristics and total energy usage data, as well as evaluation of the central steam and chiller plants. The data are used to identify the most promising sites for SES activity and technical support to help develop the SES project objectives and energy usage baselines as needed.

A draft report written in April 1991 assessed the energy use baseline to recommend the most probable SES projects at the site. The principal SES

project opportunities focused upon in the report were 1) retrofits to lighting systems, 2) thermal storage, and 3) gas-driven chillers. The report is currently under review by the Navy and FEMP.

*[The Navy contact for this work is Tom Lewis, CHESDIV (202) 433-4726.]*

4.2.3 Lake City Army Ammunition Plant

The test report ***Temperature/Humidity Study in Buildings #3 and #65 Charging Wings*** was prepared in December 1990 based on testing conducted in the fourth quarter of FY90. The current controllers proved to be accurate to within 2°F and were controlling to within 4°F. Therefore, several recommendations were made for further evaluation and improvement in the temperature and humidity control in the charging wings. These included replacing, or refurbishing and recalibrating, strip chart controllers/recorders in the charging area to give more accurate control for temperature and humidity; replacing controllers in the electronics laboratory; and reevaluating the temperature and humidity conditions under which operations need to be curtailed for product quality. Additional long-term monitoring of temperature was recommended to better characterize the conditions of operation (see below).

PNL prepared four MAPs for testing at this site in November 1990. The tests include 1) measuring lighting levels in selected production and office buildings, 2) measuring the electrical output and condition of standby diesel generators, 3) measuring long-term seasonal temperature and humidity level in charging areas, and 4) verifying steam delivery efficiency and evaluating steam distribution upgrade analysis and recommendations.

PNL also proposed to provide the site technical assistance, review, and support as the Lake City plant undertakes major electrical, steam, and mechanical distribution systems upgrade projects.

*[The Army contact for this work is Bo Hajduczok (210) 724-5788.]*

4.2.4 U.S. Department of Agriculture (USDA)/Forest Service

Graham Parker made contact at the ASTM meeting in October 1990 with Mr. George Lippert, Chief Facilities Engineer of the USDA Forest Service [(202) 453-9432]. Mr. Lippert was interested in PNL assisting in energy conservation projects at a 400,000-ft² U.S. Forest Research Laboratory in Madison, Wisconsin. He was interested in MEL applications, as well as the overall FEDS approach and SES projects. An initial site visit to the Laboratory is anticipated for the third quarter of FY91.

PNL also met with Mr. Lippert and Walter Aughenbaugh, Chief Engineering Branch of the USDA in January 1991, to discuss potential MEL applications and/or FEDS within the USDA. The USDA is interested in lighting projects for its large building stock, particularly in the Washington, D.C. area.

*[The PNL contact for this work is Bill Currie (509) 375-3969.]*

### 4.2.5 Air Force Logistics Command (AFLC)

PNL was contacted by Mr. Gary DeVeny of AFLC concerning potential MEL applications at AFLC sites. Mr. DeVeny attended a MEL Use Committee meeting in April 1990 as a guest representing the Air Force. He indicated that AFLC was considering an evaluation of metering needs at each of its major depots.

A follow-up conversation indicated that Gary was interested in information regarding new lighting technology. He was specifically interested in high-frequency fluorescent fixtures. Per recommendation from FEMP, Gary was invited to attend the April 1991 meeting of the MEL Use Committee, at which the new FEMP-sponsored Federal Relighting Initiative was scheduled to be discussed.

*[The Air Force contact for this work is Gary DeVeny (513) 257-4107.]*

### 4.2.7 Department of Transportation (DOT)/Merchant Marine Academy (MMA)

The MEL capability has been applied since the first quarter of FY90 to assess energy usage baseline in buildings and monitor central plant and whole-building loads to identify promising energy conservation opportunities for the site. The data will be used to help the MMA develop specifications for a shared energy savings procurement.

A site visit was conducted in January 1991 to review testing with the site energy engineer and arrange local pipefitter/welder subcontract support for boiler delivery efficiency measurements. The DOE MEL was moved to the site to provide work space.

Boiler efficiency measurements were completed on the two boilers in March 1991. Steam delivery to the distribution system was also measured during a 10-day test period. Loggers and instruments were installed to measure whole building electrical demand in Fulton-Gibbs Hall, Bowditch Hall, and the Library.

The electric usage in three large monitored buildings showed a baseline of 320 kVa and a daytime load of about 200 kVA above the baseload. Not only are there significant opportunities for retrofits in the buildings, but a significant fraction of the baseload likely consists of equipment that can be turned off at night and weekends. Approximately 75% to 85% of the daytime load is lighting; the balance is primarily computers, copiers, and other office equipment. This translates to only about 1.0 $W/ft^2$.

Based on building schedules and empirical data, PNL recommended high-efficiency security and general lighting, high-efficiency photocell exterior lighting, occupancy sensors, hallway delamping, and lighting on demand in the library stacks.

Recommended central boiler modifications based on the data included retubing the boilers, reheating combustion air with a stack recovery heat exchanger, improving the burner controls and excess air trimming controls, and

reducing steam pressure. Recommended measures on the load side of the distribution system include improvement of load controls and elimination of any existing non-return loads.

*[The DOT contact for this work is Jack White (202) 366-2812.]*

4.2.8 Marine Corps Base Camp Pendleton

A MAP [PENDLT-001] was prepared in January 1991 for this site to evaluate the electrical distribution system to support the preparation of an SES solicitation for the entire site. Testing is anticipated to begin the during third quarter of FY91 pending receipt of funding.

*[The PNL contact for this work is Bill Currie (509) 375-3969.]*

4.2.9 Naval Underwater Systems Center (NUSC)

PNL is undertaking a heating plant modifications study at the NUSC facility in New London, Connecticut. As a part of this study, NUSC has queried PNL about the potential for evaluating the steam distribution system as well as the energy supply and distribution system for the entire facility.

NUSC installations at New London, Connecticut, and Newport, Rhode Island, are under consideration as sites for FEDS activity. The servicing utilities have several demand-side management programs available, and the sites show considerable potential for fuel-switching and efficiency programs.

A site visit was made in March 1991 to meet with the NUSC management personnel to review the results of the work on the steam plant modifications and to discuss future work and funding. During the visit, the statement of work was revised to reflect the dual fuel options for the future operation of the plant. The design for a new stack and foundation is being completed for submission to NUSC in April.

*[The PNL contact for this work is Bill Currie (509) 375-3969.]*

4.2.10 Hanford Energy Conservation Project (HEMC)

Several testing activities are under way within the HEMC that contribute to the enhancement of MEL testing procedures and capabilities as well as provide data for energy conservation opportunities identification and verification. These include

- motion sensor evaluation for lights and fans
- analysis of Hanford electricity usage data
- personal computer and associated auxiliary equipment energy usage study
- electrical metering of buildings and chillers
- Federal Building lighting and energy usage metering.

*[The DOE contact for this work is William White (509) 376-6214.]*

### 4.2.6 Knolls Atomic Power Laboratory (KAPL)

Graham Parker was contacted by Chet Watson, energy manager at Knolls Atomic Power Laboratory (Albany, New York), concerning the capabilities of the MEL. He had read about the MEL in a FEMP newsletter. The overall testing capabilities were discussed, as was the potential for applying FEDS at KAPL. Because Knolls is in the Niagara Mohawk service territory, there appeared to be significant opportunity for utility assistance in conservation programs (see Section 5.0).

*[The PNL contact for this work is Doug Dixon (509) 376-5832.]*

### 4.2.11 Air Force Strategic Air Command (SAC)

Discussions were held in February 1991 with Robert Jay, Energy Program Manager responsible for SAC bases, to assess the potential interest by Griffiss AFB in participating in the FEDS project in cooperation with Niagara Mohawk and other federal sites in New York (see Section 5.0). Mr. Jay directed us to the site energy manager (Mark Rabe) for follow-up discussion and initial coordination for an on-site meeting.

A meeting was held at Griffiss AFB in March 1991 to assess site interest in the FEDS opportunity. Discussions were held with SAC headquarters (HQ) to determine if funding may be available to model the program at Griffiss AFB.

*[The PNL contact for this work is Doug Dixon (509) 376-5832.]*

## 4.3 NAVAL ENERGY AND ENVIRONMENTAL SERVICES ACTIVITY (NEESA) TESTING

MEL activities undertaken by NEESA are directed by Jim Heller *(805) 982-3534*. Selected NEESA testing and related activities during the reporting period are summarized as follows:

- NEESA provided quality assurance support during installation of 21 steam meters at Naval Air Depot (NADEP) Pensacola. Steam and electric meters will be tied to a local area network for remote monitoring.

- Specifications were provided for upgrading boiler and trunk-line steam meters at Lakehurst Naval Air Station.

- NEESA completed the repair of the Pier 1 variable-speed drive pumping station and developed a draft 5-year energy plan for the Naval Station San Diego.

- An assessment of thermal energy storage feasibility for the Public Works Center (PWC) Norfolk was completed.

- A load-shedding assessment for PWC Norfolk was completed. A load-shedding system would use radio-controlled switches to shed air-conditioning loads during peak electrical consumption periods.

- NEESA provided service to eliminate boiler and steam converter water treatment problems at the Marine Corps Base Barstow.

- Vibration analysis equipment was procured and scheduled for installation at the Public Works Center, Guam.

## 5.0 FEDERAL INSTALLATION-UTILITY PARTNERSHIP ACTIVITIES

FEMP through PNL is designing and implementing a model FEDS program for federal customers in partnership with the servicing utility. The model program includes

- identifying all electric and nonelectric cost-effective energy efficiency projects at the federal installation
- developing a schedule for each installation for project acquisition considering project type, size, timing, capital requirements, and energy and dollar savings
- designing and implementing a model approach that the utility could propose to its regulatory agencies for application to all its federal customers.

Projects in this model program are any actions that support the installation's mission and result in a reduction in energy costs and/or energy demand and usage. Examples of projects include energy end-use technology retrofits, on-site generation, cogeneration, innovative scheduling and operations, fuel switching, and rate structure evaluation.

A facility-wide, fuel-independent approach to identifying and acquiring energy projects yields the greatest savings and greatest return on taxpayer investments. Experience by PNL at over 20 federal installations indicates that the typical federal installation could invest from one to two times the installation's annual energy bill in cost-effective projects. Benefits are significantly increased when combined with creatively designed utility programs.

Federal installations face three major constraints in identifying and acquiring the most cost-effective energy projects:

- lack of direct access to capital
- requirement to follow procurement procedures that can take a year or more to implement
- absence of a systematic approach to managing all aspects of an installation's energy portfolio.

The model program will address each of these constraints. First, PNL provides direct support to an installation to characterize its energy use and identify and evaluate all cost-effective energy projects. Second, PNL will coordinate a team from the utility and each installation to design a prototype process with the goal of the utility providing 100% of the financing as well as procuring the contractor(s) who would implement electric energy-efficiency projects that would be cost-shared between the installation and utility.

## 5.1 Bonneville Power Administration/Tacoma Public Utilities Project

Working with FORSCOM, PNL identified Fort Lewis, Washington, as the site for a pilot program that would result in a model approach to use at other installations. Fort Lewis purchases Bonneville Power Administration (BPA) power through Tacoma Public Utilities (TPU). The fort has approximately 5000 buildings and is projected to have an electric load of about 40 MW by next year.

FEMP and PNL have been working with BPA, TPU, FORSCOM, and Fort Lewis since the second quarter of 1990 to design the model program. This includes two major activities: 1) characterizing the energy-efficiency opportunities at Fort Lewis, and 2) designing the "deal" that will allow BPA to purchase energy efficiency from the installation.

Work continued in October 1990 to develop electrical energy conservation supply functions. Nine typical buildings were examined to serve as sites for energy use metering and modeling activity to firm up energy conservation potentials. Additional information was acquired on the water supply and treatment systems, as well as on major nonappropriated facilities.

In November 1990, the MEL staff began to work with the PNL staff who are leading the FEDS work at the site to ascertain what additional testing or metering activity was necessary to support the FEDS work.

The electrical load profiles for the major building types for the entire site have been characterized as part of the FEDS activity. The MEL testing staff met with the FEDS staff in December to ascertain the steam distribution testing needed to support the FEDS work.

PNL met with both TPU and Fort Lewis staff in December 1990 to review the assumptions employed to generate a first-draft baseline of end-use electricity use and efficiency potential at the site. The utility responded that the draft information was sufficient for it to proceed with TPU management in scoping the size of the project.

In January 1991, PNL met with the staff from the Fort and TPU to resolve financial and contracting issues for proceeding with the retrofit phase of the project. The fossil fuel baseline and efficiency assessment activity was initiated with PNL staff visiting the site to gather building consumption information.

A draft report on the electric energy baseline and efficiency resource assessment was completed in February 1991 and distributed to Fort Lewis, TPU, and FEMP for review and comment. The results of the report were also presented to Fort Lewis and TPU staff at a progress meeting held at Fort Lewis. The report was revised in April 1991 and submitted to FEMP.

The results indicate that approximately 40 million kWh/yr of efficiency resource are available at a cost of less than $0.03/kWh. If acquired in the partnership project, these savings would reduce the site's annual electricity

bill by nearly $750,000. The work is continuing in the third quarter of FY91 with the nonelectric assessment and continued negotiations between the site and the utility.

## 5.2 Niagara Mohawk Project

A project was initiated in February 1991 to link Fort Drum, Watervliet Arsenal, Griffiss Air Force Base (AFB), and Knolls Atomic Power Laboratory with a tailored demand-side program by the serving utility, Niagara Mohawk, developed specifically for its federal customers. This program is similar to the program developed for Fort Lewis and would eventually be available to all federal facilities in the Niagara Mohawk service territory.

Like the BPA/TPU project, this model program would systematically evaluate all potential energy savings opportunities at the sites and allow the sites to take advantage of technologies offered by the utility. First, PNL will provide direct support to the sites to characterize its energy use and identify and evaluate all cost-effective energy projects for all fuels. Second, PNL will facilitate a team from Niagara Mohawk and the sites to design a prototype process with the goal of Niagara Mohawk and the federal customer cost-sharing the installation of efficient electric end-use technologies. In implementing this program, objectives are for Niagara Mohawk to provide 100% of the financing and to procure the contractor(s) who would implement electric energy-efficiency projects.

Initial discussions were held at Knolls Atomic Power Laboratory and Griffiss AFB in March 1991, and with Niagara Mohawk, Fort Drum, and Watervliet Arsenal in April 1991. The meeting with Niagara Mohawk was a follow-up to the early discussions about the utilitys's interest in developing a model program for its federal customers. Niagara Mohawk welcomes assistance from FEMP/PNL in understanding the federal sector and determining what it would take for these customers to participate in demand-side management programs. Commitment to proceed was obtained from Fort Drum, with FORSCOM providing the funding for the effort.

A project overview was provided to Watervliet Arsenal during the site visit. The site was interested; subsequently, a proposal was prepared for Watervliet to pursue its funding for the project. Likewise, Knolls Atomic Power Laboratory is committed to participating in the program and is working out the transfer of funds within DOE. SAC HQ is interested in funding Griffiss AFB participation as a pilot program for all SAC sites.

## 6.0 TESTING EQUIPMENT AND MOBILE ENERGY LABORATORIES

### 6.1 MOBILE ENERGY LABORATORY VEHICLES

The DOE MEL parked at the National Naval Medical Center was inventoried, then taken to a repair shop for minor repairs and transported to the Merchant Marine Academy for testing activities at that site to be undertaken in February.

The Air Force and Army buses located at PNL were moved to the Hanford maintenance facility for half-yearly maintenance. Leaks were discovered in the cooling systems of both buses; all hoses, the antifreeze, and the batteries were replaced in both units. A new procedure has been implemented to regularly start the buses to prevent the batteries from deteriorating.

### 6.2 EQUIPMENT DEVELOPMENT

Richard Szydlowski of PNL met with Richard Rundus and Lee Edgar of CERL in October 1990 to discuss automatic meter reading (AMR) projects. Jim Heller from NEESA also attended the meeting. CERL has several ongoing AMR activities primarily in family housing. The largest project is at a reimbursable mobile home court at Fort Benjamin Harrison. In addition, CERL has installed 10 C180 Synergistics Control Systems data loggers at Fort Still for collecting and storing electrical usage data. The loggers are currently not active, and the project is delayed because CERL is waiting for Synergistics to update the loggers with a call-out feature. This is not expected for several more months. Considerable additional development work needs to be undertaken on both systems before they become products with widespread applicability to DoD sites.

CERL is also developing an AMR equipment database. The database is generic (no detailed specifications or costs) and by equipment technology. The database is designed to allow a new AMR project to focus on the appropriate technology and to provide a list of manufacturers who provide equipment with that technology.

In January 1991, PNL staff conducted an in-situ evaluation using the C180, Dranetz 808, and power analyzer instrumentation to clarify error sources and magnitudes when measuring true and apparent power. It was determined that the three-current-transformer (CT) method should be applied to delta circuit configurations whenever possible. The two-CT method should be applied only when low phase-angle error CTs are used. Low phase-angle error CTs should also be used with the three-CT method if power factors of 0.9 or less are expected. All three instruments and the two methods (two- and three-CT) are used in MEL field testing at substations. Therefore, the results of this testing are significant for current and future data analysis and for future applications.

The capability to measure hot water flow in the form of steam system condensate return was developed and proven out in testing at Fort Lewis in March. The flow-measuring and signal-conditioning equipment was searched out and custom-ordered to accomplish this task. Hardware was procured with the

remainder of the FY90 FEMP equipment funds. This gives the MEL an additional capability, primarily for situations in which directly measuring steam flow is impossible.

## 6.3 EQUIPMENT

In October, PNL quality control recertified Energy Measurements Co. (EMCO)[a] for calibrating the flow computers. There was concern that EMCO was not meeting quality control requirements after reorganizing its quality control system.

All MEL equipment located at PNL was inventoried in October 1990. An *Equipment Availability System* is being established to allow better control over scheduling equipment for future testing. The system will give a status of all MEL equipment including equipment available, equipment being used for testing at a site, equipment out for repair or for calibration, and when the equipment is expected to be returned to PNL.

A form and process were developed to streamline the identification and packing equipment for site testing. This process will be reflected in a revision to the MEL Property Control and Calibration procedure, which is Appendix B of the ***MEL Use Plan***.

Major equipment purchased and received during the reporting period includes

- two portable computers and software
- data collection computer and software
- 100-MB hard drive
- two multisync three-dimensional monitors
- facsimile/data modem
- two laser printers and two portable printers
- two cellular telephones and compatible modems
- electromatic ultrasonic thickness gauge
- pressure calibration system
- Solomat Solopac Plus
- halogen leak detector
- combustion analyzer
- two Synergistics Control Systems C180 data loggers
- 12 large current transformers
- eight paddlewheel flow meters and signal conditioning
- positive displacement fuel oil flow meter
- high-quality light meter
- label printer.

Several replacement and upgrade parts also were also purchased for MEL equipment using the funds from the equipment use-rate "tax" accounts that have accumulated over the past year of site testing. These items include new

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[a] Energy Measurements Company, Longmont, Colorado.

sensors, transmitters, power supplies and amplifiers for the data loggers, flow meters, combustion analyzers, and recorders.

## 7.0 PROCEDURES AND DOCUMENTATION

### 7.1 TEST PROCEDURES

The goal of this activity is to develop test procedures and take each procedure through a peer review and revision process that culminates with acceptance by an appropriate standards society.

Graham Parker attended the semiannual ASTM Meeting for Subcommittee E06 on Performance of Building Constructions in October. He attended several task group meetings to best ascertain which task groups would accept appropriate MEL test procedures for consideration for standardization. It appears that several of the procedures can be slotted into this subcommittee and be balloted for acceptance over the next 12 months.

While at ASTM, PNL received an invitation from the chairman of Subcommittee E06 to prepare a journal article for ***ASTM Standardization News*** describing the test procedures being developed by PNL for MEL and other related testing activities. This is an excellent opportunity to promote the concept of standardized test procedures for energy-efficiency testing.

Don Hadley, PNL, attended the March ASTM meeting in Baltimore. Several discussions were held with Gerald Davis (chairman Subcommittee E06.25 on Whole Buildings and Facilities) on the procedures PNL intends to submit to ASTM and how this would be best accomplished. It was finally decided to form a new task group under E06.25, chaired by Don Hadley, to facilitate the introduction of all appropriate MEL procedures and thus streamline the balloting process.

The work plan for procedure development activities for calendar year (CY) 91 was completed. A schedule for completing the remaining priority 1 procedures this year was also established (see Attachment 3). The schedule will accelerate the incorporation of Corps of Engineers comments into draft procedures and complete the drafting of the most important procedures.

### 7.2. MEL ASSIGNMENT PLANS

When appropriate, MEL Assignment Plans (MAPs) are prepared by PNL for MEL testing. The following MAPs were prepared during the reporting period:

| Site | MAP No. | Test Description | Date |
|---|---|---|---|
| Lake City AAP | LKCITY-001 | Measure Lighting Levels and Determine Lighting Conservation Opportunities | 11/90 |
| Lake City AAP | LKCITY-002 | Measure Electrical Output and Condition of Backup Diesel Generators | 11/90 |
| Lake City AAP | LKCITY-003 | Measure Long-Term Seasonal Temperature and Humidity Levels in Charging Areas | 11/90 |

| Site | MAP No. | Test Description | Date |
|---|---|---|---|
| Lake City AAP | LKCITY-004 | Verify Steam Delivery Efficiency and Independently Evaluate Steam Distribution System Upgrade Analysis and Recommendations | 11/90 |
| Camp Pendleton | PENDLT-001 | Baseline Profile of Electrical Distribution System | 01/91 |

## 7.3 REPORTING

Test reports are prepared after the testing activities described in the MAP are completed. The reports for FORSCOM testing are reviewed by SAS, revised (if necessary) by PNL, and then transmitted by SAS to the site as final reports. Additional revisions are made by PNL if comments are received by SAS from the site. Test reports for other agencies are transmitted directly to the site and major command or funding agency. The current status of MEL reports is given in Attachment 4.

During the reporting period, the following MEL test reports were prepared:

- Final Test Report FTMAC-003-90/10/19 ***Combustion Efficiency of 10 Small Boilers***
- Final Test Report FTMAC-001-90/10/30 ***Boiler Combustion/Delivery Efficiency***
- Final Test Report LEWIS-005-90/10/30 ***Commissary Electric Profile***
- Final Test Report for Lake City Army Ammunition Plant ***Temperature/Humidity Study in Buildings #3 and #65 Charging Wings***
- Draft Test Report CARSON-003-91/03/20 ***Building 8000 Air Compressor Replacement***
- Draft Test Report FTMAC-002-91/04/05 ***Building 200 ($C^2F$) Electrical Usage Evaluation***
- Draft Test Report STWRT-001-R1-91/04/12 ***Electric Substation Monitoring***
- Draft Test Report LEWIS-003-91/04/15 ***Sewage Effluent Pump Analysis***
- ***Feasibility Analysis for a Shared Energy Savings Lighting Retrofit at Ft. McPherson***
- ***Ft. Lewis Electric Energy Baseline and Efficiency Resource Assessment***
- ***Energy Use Baselining Study for the National Naval Medical Center***

- ***U.S. Maritime Administration Merchant Marine Academy Monitoring to Support a Shared Energy Savings Procurement.***

7.4 OTHER DOCUMENTATION

Other documentation prepared during the reporting period includes

- "Measurements for Energy Efficiency Improvements Using the Mobile Energy Laboratories," article submitted to ***Energy Engineering Journal***
- Parker, G.B., and J. W. Currie, ***Energy-Efficient Testing Activities of the Mobile Energy Laboratory*** Semiannual Report April 1, 1990 Through September 30, 1990. PNL-7652. Pacific Northwest Laboratory, Richland. Washington
- Trip report for site visit to Fort Sam Houston to perform chiller testing
- Trip report for site visit to Fort Carson to discuss energy metering study
- Trip Report on testing activities at Fort Ord
- Summary of Costs and Activities at FORSCOM Sites During FY91 for FORSCOM Annual Report
- Technical Review of Fort Riley Electrical Distribution Study
- Trip Reports #1, #2, #3, and #4 for MEL testing for LEWIS-006-R1 and LEWIS-007-R1
- Project Summary: ***The Ft. Lewis Energy Efficiency Model Program***
- Field notes on boiler efficiency testing.

ATTACHMENT 1

# MOBILE ENERGY LABORATORY USE COMMITTEE
# MEETING MINUTES
# OCTOBER 24-25, CHICAGO, ILLINOIS

# MINUTES

## MOBILE ENERGY LABORATORY USE COMMITTEE MEETING

## OCTOBER 24-25, 1990, CHICAGO, ILLINOIS

The Mobile Energy Laboratory (MEL) Use Committee meeting was called to order on October 24, 1990 at 0920 hours at the Ramada Inn, Oak Book, Illinois. Those present included:

Members

| | |
|---|---|
| K. Dean Devine | Department of Energy Federal Energy Management Program (DOE/FEMP), MEL Use Committee Chairman |
| Jim Vasiloff | Forces Command (FORSCOM), Army MEL Use Committee Representative |
| Bill Riches | FERMI Laboratories, Other Federal Agency MEL Use Committee Representative |
| Jim Heller | Naval Energy and Environment Support Activity, U.S. Navy MEL Use Committee Representative |

Visitors

| | |
|---|---|
| Graham Parker | PNL, FORSCOM/MEL Project Manager |
| Rich Szydlowski | PNL, FORSCOM/MEL Technical Coordinator |
| Fred Blackburn | Savannah District Corps of Engineers (SAS) |
| Dale Herron | Corps of Engineers Research Laboratory |

Mr. Michael Santoro, U.S. Air Force Engineering Support Center (AFESC), U.S. Air Force MEL Use Committee Representative was not in attendance. Contact with Mr. Santoro prior to the meeting indicated that Mr. Santoro had moved to a new position within the AFESC and had turned over the MEL responsibility to Mr. Steve Hathaway. The secretary was unable to contact Mr. Hathaway prior to the meeting about his attendance. Mr. Hathaway will be sent all Committee material and requested to attend the next meeting.

The four voting members of the committee that were present represented a quorum and therefore official business could be conducted.

Prior to working from the agenda, Dean Devine gave the committee a synopsis of the organization and activities of the FEMP. Primary responsibility of FEMP is to report to congress on the progress toward energy efficiency in the federal sector. Several programs are underway at FEMP to assist federal agencies in achieving energy goals. These include the new federal relighting initiative, shared energy savings(SES) support, technology base support, and the federal energy decision screening (FEDS) tool development. Many of these programs are being undertaken by PNL. It was suggested that the FEDS activity be presented to the Committee at the next meeting.

Agenda Review

The agenda (Attachment 1) was approved with one minor change. Since Dean needed to return to Washington D.C. early that afternoon, he requested that the discussion of the status and strategy for Department of Transportation participation in MEL be moved to immediately after lunch.

Approval of Minutes from Previous Meeting

It was moved and seconded to approve the minutes from the previous meeting. Motion passed.

Appointment of New Executive Secretary

Because of changes in work assignments for Rich Mazzucchi, PNL proposed that Graham Parker replace Rich and serve as the Executive Secretary of the MEL Use Committee. A motion was made and seconded to appoint Graham Parker as Executive Secretary of the MEL Use Committee. Motion carried.

MEL Use Plan Proposed Revisions

The Committee spent considerable time reviewing the proposed changes to the MEL Use Plan. Two documents were provided to the Committee prior to the meeting. One document showed the proposed changes (additions and deletions) inserted into the text; the other document showed the "final" document with the changes. Several additional changes/modifications were recommended and approved by consensus. A marked-up copy with the additional changes will be sent to each member for final review. The members will inform the secretary if they agree with these new changes before the revised Plan is prepared for sign-off and publication. The marked-up copy will be sent out by the end of November and the revised Plan will be published by January, 1991.

Status of Other Agency Participation

Discussion proceeded on the status and interface of various federal agencies in relationship to the use of MEL.

DOT--Bill Riches had a conversation with Mr. Gerleman regarding their continued interest in using the MEL in pursuing energy conservation programs within the urban transportation group of the 5-state region. Bill requested guidance from the committee concerning the potential for using the MEL. Dean indicated that within the broad charter of FEMP, this was possible especially since the urban transportation group received federal funding. Conservation programs instituted as a result of MEL testing would ultimately benefit the federal government.

It was decided that Bill should once again contact this group, indicate to them that the MEL could potentially be available and arrange for a meeting with PNL and/or FEMP to explore the types of testing/conservation activities that may be undertaken. With the current revisions to the MEL Use Plan, FEMP could support the initial activities associated with developing a test plan for this organization.

It was also decided that the Charter of the MEL Use Committee may need to be revised to enable MEL services to be available to those outside the "federal" sector. This will be an item of discussion for the next meeting.

SAS--Fred Blackburn discussed the role played by SAS in the MEL/FORSCOM applications project. In summary, PNL sends all initial site visit reports, procedures and test reports through SAS for review and approval. SAS keeps other organizations informed of MEL activities including the Tennessee Valley Authority and other Corps of Engineers organizations.

In addition, SAS has been working with the Training and Doctorate Command (TRADOC) to bring in MEL capabilities to assist TRADOC sites were appropriate. Currently, SAS is working with 5 TRADOC installations in a utility evaluation project. MEL will likely need to be used in one phase of this project.

Material Command (AMC)--Graham Parker reported on PNL's work with AMC at the Lake City Army Ammunition Plant (AAP) to assist in 3 upgrade projects. PNL has recently submitted a statement of work to perform a complete evaluation of the Lake City steam distribution system. MEL equipment would be used in this study which would begin early in 1991.

Air Force--PNL's activities with Edwards Air Force Base was discussed. The probability for MEL activities at Edwards is likely to be a year away. Fred Blackburn indicated that Bill Plunkett of SAS was presenting MEL capabilities at a meeting this week of all DEH personnel from the Air Force. Fred will report on the results of that meeting.

Fred also indicated that SAS desires to become the technical center of excellence for automated mapping and facility management for site utilities. In this role, SAS will be able to cross service boundaries and therefore have access to all Army and Air Force sites for this technology area. Studies may need to be done on utilities at these sites and MEL will have a role in this.

U.S.Marines--Graham Parker summarized PNL's activities at Twentynine Palms Marine Base to assist in developing an expert system for operation and maintenance of their central power plant. Jim Heller indicated that NEESA has examined software packages for this application and suggested PNL contact Peter Fanning at NEESA (805) 982-3562 for more information.

Other Federal Agencies--Graham Parker discussed the possibility of PNL implementing FEDS at a U.S. Forest Service Research and Development Laboratory at Madison, Wisconsin. MEL may need to be deployed as part of this activity.

The metering of the DOE Forrestal Building by PNL was also discussed by Rich Szydlowski.

Bill riches passed out information on his evaluation of the electrical distribution system at FERMI Laboratories (see Attachment 2). Within this discussion, the issue of the repair and calibration of the MEL equipment currently being used by FERMI in their work. This equipment includes 3 Dranetz 808 Analyzers and 3 Techtran 990 recorders. One of the Techtrans is currently inoperable and the Dranetz needs to be calibrated prior to using them again starting in December, 1990. This issue was to be resolved prior to this meeting. Bill thought that PNL would be able to exchange Dranetz for calibrated units. However, PNL currently has most of their units committed in the field or otherwise unavailable.

The Committee decided that neither FEMP nor PNL should pay for calibration of this equipment without compensation. Bill was requested to develop a plan for calibration and replacement of Techtran. This recommendation will be reviewed by the committee for approval. Jim Heller indicated that NEESA may have a spare Techtran for loan to FERMI.

Bill also passed out information on FERMI energy savings recognition by DOE and Bill's award for Regional Energy Engineer. (See Attachment 3).

The first day's meeting ended at 1645 hours.

THURSDAY, OCTOBER 25, 1990.

The meeting was continued at 0830 hours. Those in attendance for the second day included:

Jim Vasiloff, FORSCOM
Jim Heller, NEESA
Rich Szydlowski, PNL
Graham Parker, PNL
Fred Blackburn, SAS

Ms Jerry Northrup, CERL was to attend today's meeting to make the CERL presentation, however, she left a message that she would be unable to attend.

MEL Procedure Development and Testing/Reporting Status

Graham Parker presented information on the current status of the test procedure development (see Attachment 4). Included in this material is a diagram showing how all of the procedures currently under development fit together in the scheme of testing activities. The priority for completing the procedures was discussed. Priority is established based on need (current and future) and experience in the field. One procedure (end-use metering) will be submitted to ASTM subcommittee ballot in the next 4 weeks as the first step toward standards society acceptance.

Jim Heller indicated that NAFAC/NEESA would be willing to review draft test procedures and would be willing to accept completed test procedures for possible use.

The current MEL Suspense Schedule and status of the MEL Assignment Plans and Test Reports were also discussed (see Attachment 5). Testing is currently being conducted at 4 sites with about 1/2 of the test reports for the completed testing yet to be written. Fred Blackburn commented on the high quality of the test reports reviewed by SAS staff.

Test Equipment Status

Rich Szydlowski presented the current status of the purchase of test equipment for the MEL (see Attachment 6). Approximately $70K of test equipment was purchased by PNL and NEESA (for PNL) in FY90.

Approximately $17K of reusable supplies were purchased by FORSCOM; $21K of equipment was transferred from SAS to PNL; and $1500 of equipment was transferred from DOE. Approximately $16.5K of FEMP equipment funding received in FY90 remains. This will likely be used to upgrade the flow measuring equipment since there is a high demand for this equipment for future testing and the current equipment is old and in need of constant maintenance.

Rich also discussed the recent developments in testing apparatus/software. This includes software for direct PC connection with the flowmeters for chilled water flow, and for direct connection with the Dranetz 808 analyzers. In addition, PNL has designed a new, less expensive, valve assembly for use in chiller (low temperature) testing. NEESA requested a drawing of the assembly for possible use in their testing.

Selected MEL Testing Results

Rich Szydlowski presented selected MEL test results (see Attachment 7). These included the substation metering at Ft. Lewis, chiller performance testing at Ft. Sam Houston, and Building 200 total electric metering and boiler combustion efficiency testing at Ft. McPherson. He discussed the significance of the results and the quality assurance procedures PNL employs while doing field testing.

Fred Blackburn inquired about the results from the Hunter substation metering. He would like any preliminary data ASAP so that it could be used in a feeder upgrade project scheduled for the site.

Jim Heller briefly discussed the activities at NEESA over the last 6 months (see Attachment 8). Among the activities discussed were writing specifications for remote metering system at NADEP n Florida, the data collection on the central steam plant at Twentynine Palms, California, metering work at Ft. Bliss and SCADA development at the Public Works Center in Alameda, California.

It was apparent that many of the NEESA activities have direct relevance to MEL and other related ESMO activities being undertaken by PNL.

Graham Parker presented an overview of MEL-related activities at other federal sites (see Attachment 9). Much of this information was a repeat from the information presented the first day of the meeting.

Journal of American Military Engineers Article

Graham Parker distributed a draft Abstract and (incomplete) article

for submission to the American Military Engineer Journal (see Attachment 10). The Committee felt that a feature-type article that was descriptive of the MEL and its history (brief) with a summary of test results would be more appropriate for this type of journal. Since the readership of this magazine is primarily "upper management" and not the practicing/field engineer, an article focusing on test results may be more appropriate for either a follow-on article or article for another journal (such as the Energy Engineers Journal). The Committee also felt that the figures should be simple and photos should be included as part of the article. Lastly, the Committee felt that mention of the role of MEL in infrastructure modernization would be important to emphasize to capture reader's attention.

Graham agreed to revise the article to include the elements discussed and prepare a second (companion) article that describes the testing results in more detail. Both articles will be submitted to the committee for review and comment. In addition, Jim Heller agreed to submit some test results from NEESA testing (perhaps on steam/boilers) for inclusion in the alternate (second) "technical" article.

Next Meeting

It was suggested and agreed upon to hold the Spring 1991 MEL Use Committee meeting in Orlando, Florida, April 3-4. The committee agreed that SAS would be an invited guest for that meeting.

Items arising from this meeting for the Spring 1991 meeting include:

- Revision to the MEL Use Committee Charter to include provision for usage of the MEL by non-federal agencies.
- Proposal for dealing with the buses.
- FEDS presentation by PNL

Adjournment

It was moved and seconded to adjourn the Fall 1991 meeting. The motion passed and the meeting was adjourned at 1500 hours.

Summary of Action Items

The following is a listing of action items from the meeting and persons responsible for those items. The estimated date for completing the action is also given. It will be the responsibility of the Executive Secretary for assuring that these items are

completed prior to the Spring 1991 meeting.

| Item | Person | Date |
|---|---|---|
| 1. Provide a report to Bill Riches on IHEM Lighting Study completed by PNL | G. Parker | 11/90 |
| 2. Provide hand-marked copy of MEL Use Plan for Committee review | G. Parker | 11/90 |
| 3. Prepare MEL Use summary (1-page) for distribution with Brochure | G. Parker | 11/91 |
| 4. Distribute copy of executive order directing FEMP activities | D. Devine | 11/91 |
| 5. Provide electronic copy of NEESA addendum to the MEL Use Plan and copy of ALESP manual to PNL | J. Heller | 11/91 |
| 6. Prepare the FEMP/MEL Semi-Annual Report for the period April 1990 to September 1990 | G. Parker | 11/90 |
| 7. Provide data from Hunter substation metering to SAS | G. Parker | 11/90 |
| 8. Prepare revised article(s) and submit to Committee for review | G. Parker | 11/90 |
| 9. Transmit copy of MEL project summary to NEESA for use in newsletter | G. Parker | 11/90 |
| 10. Prepare proposal for calibrating and replacing equipment being used by FERMI | B. Riches | 12/90 |
| 11. Finalize article(s) and submit to American Military Engineer Journal | G. Parker | 01/91 |
| 12. Revise MEL Use Plan and submit to Committee for final signature; publish | G. Parker | 01/91 |
| 13. Meet with regional DOT and report on discussion concerning MEL use. Report to Committee the results of meeting | B. Riches | 02/91 |
| 14. Prepare agenda and make arrangements for Spring 1991 MEL Use Committee meeting | G. Parker | 02/90 |

| | | | |
|---|---|---|---|
| 15. | Make arrangements for Committee members to obtain FEMP-Net electronic mail | G. Parker | 01/91 |
| 16. | Prepare a proposal for disposition of the buses | G. Parker | 03/91 |
| 17. | Arrange for a presentation of FEDS at MEL Use Committee Meeting in Spring 1991 | G. Parker | 03/91 |

# Attachment 1

## MEL Use Committee Meeting Agenda

**MOBILE ENERGY LABORATORY USE COMMITTEE**
**FALL 1990 MEETING**
**FINAL AGENDA**
**90/10/19**

LOCATION: RAMADA INN OAK BROOK 933 So. Route 83, Elmhurst IL (312) 279-0700
TERRACE ROOM

WEDNESDAY OCTOBER 24, 1990

| | |
|---|---|
| 0900 | CONVENE MEETING AND REVIEW AGENDA |
| 0915 | REVIEW AND APPROVAL OF MINUTES FROM SPRING 1990 MEETING |
| 0930 | APPROVAL OF NEW EXECUTIVE SECRETARY |
| 1000 | DISCUSSION OF PROPOSED MEL USE PLAN REVISIONS |
| 1030 | BREAK |
| 1045 | DISCUSSION OF PROPOSED MEL USE PLAN REVISIONS (Cont.) |
| 1230 | LUNCH |
| 1330 | DISCUSSION OF PROPOSED MEL USE PLAN REVISIONS (Cont.) |
| 1530 | STATUS AND STRATEGY FOR OTHER AGENCY PARTICIPATION<br>- SAS INTERFACE & ASSISTANCE<br>- ARMY/TRADOC & AMC<br>- USAF/AFESC<br>- NAVY/MARINE CORPS<br>- DOT<br>- OTHER FEDERAL AGENCIES |
| 1700 | ADJOURN |
| 1800 | DINNER - LOCATION TO BE DETERMINED |

AGENDA - Day 2

THURSDAY OCTOBER 25, 1990

| | |
|---|---|
| 0800 | MEL APPLICATIONS AND PROCEDURE STATUS - G.B. Parker |
| 0900 | MEL EQUIPMENT AND TEST DEVELOPMENT STATUS - R.F. Szydlowski |
| 1000 | BREAK |
| 1030 | SELECTED PNL MEL APPLICATIONS - R.F. Szydlowski |
| 1200 | LUNCH |
| 1300 | U.S. NAVY MEL APPLICATIONS - J. Heller |
| 1400 | CERL ACTIVITIES - D. Herron |
| 1430 | FUTURE MEL-RELATED ACTIVITIES |
| 1515 | REVIEW OF S.A.M.E. ARTICLE ABSTRACT AND OUTLINE - G.B. Parker |
| 1600 | ACTION ITEM REVIEW AND AGREEMENT |
| 1700 | ADJOURN |
| 1800 | DINNER - TO BE DETERMINED |

# Attachment 2

## Study of Electrical Distribution System at FERMILAB

10/24/90

# SITEWIDE FEEDER LOADING JULY - AUGUST 1990:: JOSEPH PATHIYIL

| FDR OR BRK # | | 15 MIN. MAX READING | | INST. READING: BOTTOM OF RAMP | | | | INST. READING: TOP OF RAMP | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MW | PF | MW | MVA | KV L-N | PF | MW | MVA | KV L-N | PF | |
| 345 KV | INCOMING FEED | 66.69 | 0.77 | 36.3 | 49.4 | | 0.75 | 99.2 | 123.2 | | 0.81 | *3 |
| 82 | TEVATRON | 8.911 | -0.98 | 1.521 | 2.978 | | 0.51 | 32.07 | 33.11 | | 0.95 | *3 |
| 82 B | PULSE POWER | 6.739 | 0.74 | 3.9 | 4.5 | | 0.86 | 16.1 | 28.4 | | 0.57 | *3 |
| 83 A | P BAR | 4.073 | 0.75 | | | | | | | | | STEADY LOAD |
| 83-1 | FDR 30,31,32,33 | 11.96 | 0.86 | 6.681 | 6.779 | 8.008 | 0.99 | 14.12 | 19.11 | 7.673 | 0.74 | |
| 83-2 | FDR 35,36,37,38 | 14.21 | 0.93 | 12.26 | 12.66 | 8.002 | 0.97 | 15.33 | 16.96 | 7.677 | 0.9 | |
| 83-3 | 1/2 OF MAIN RING COMP | 3 | 0.84 | 3 | 3.57 | 8.002 | 0.84 | 3 | 3.6 | 7.677 | 0.83 | STEADY LOAD |
| | | | | | | | | | | | | |
| 84-1 | FDR 40,41,42,43,44 | 12.1 | 0.77 | 10.49 | 13.32 | 8.044 | 0.79 | 12.51 | 17.16 | 7.9 | 0.73 | |
| 84-2 | FDR 45,46B,47,48,49 | 13.69 | 0.87 | 11.99 | 13.86 | 7.9 | 0.87 | 14.55 | 16.73 | 7.9 | 0.87 | |
| | | | | | | | | | | | | |
| 30 | MESON | 3.477 | 0.85 | 2.546 | 2.927 | 8.006 | 0.87 | 3.309 | 4.131 | 7.662 | 0.8 | *1 |
| 31 | MESON | 3.332 | 0.82 | 2.512 | 2.792 | 8.014 | 0.9 | 4.01 | 5.17 | 7.655 | 0.78 | |
| 32 | NEUTRINO +HIL | 3.411 | 0.92 | 1.121 | 1.214 | 8.054 | -0.92 | 3.041 | 3.406 | 7.711 | 0.89 | *2 |
| 33 | NEUTRINO | 2.55 | 0.77 | 0.675 | 1.279 | 8.025 | -0.53 | 5.131 | 8.415 | 7.67 | 0.61 | |
| 35 | NEUTRINO | 2.358 | 0.88 | 2.275 | 2.544 | 8.014 | 0.89 | 2.301 | 2.538 | 7.684 | 0.91 | |
| 36 | PROTON | 2.951 | 0.82 | 2.127 | 2.363 | 8.048 | 0.9 | 3.193 | 4.068 | 7.67 | 0.78 | |
| 37 | PROTON | 3.45 | 0.81 | 2.366 | 2.511 | 8.068 | 0.94 | 4.184 | 5.432 | 7.712 | 0.77 | |
| 38 | CHL | 5.557 | 0.99 | | | | | | | | | STEADY LOAD |
| | | | | | | | | | | | | STEADY LOAD |
| 40 | LINAC | 2.265 | 0.85 | | | | | | | | | *3 |
| 41 | BOOSTER | 2.675 | 0.6 | 2.366 | 3.94 | 8 | 0.6 | 3.87 | 6.45 | 7.9 | 0.6 | STEADY LOAD |
| 42 | CUP | 3.149 | 0.88 | | | | | | | | | *3 |
| 43 | TRAN GALLERY; SW YRD | 2.054 | 0.56 | 1.224 | 1.924 | 8.012 | 0.64 | 3.296 | 6.16 | 7.939 | 0.54 | STEADY LOAD |
| 44 | WILSON HALL | 1.777 | 0.9 | | | | | | | | | STEADY LOAD |
| 45 | MAIN RING CONV. POWER | 3.352 | 0.83 | | | | | | | | | STEADY LOAD |
| 46B | 1/2 OF MAIN RING COMP | 3.428 | 0.85 | | | | | | | | | STEADY LOAD |
| 47 | INDUST BUILDING | 2.051 | 0.87 | | | | | 3.2 | 3.7 | 7.6 | 0.87 | *3 |
| 48 | MAIN RING RF | 2.635 | 0.87 | | | | | | | | | STEADY LOAD, CDF NOT ON |
| 49 | FEYMAN & CDF | 2.463 | 0.86 | | | | | | | | | |

(-PF ) MEANS LEADING POWER FACTOR

*1 ME/AN2 WAS ON FOR 15 MIN. READING AND OFF FOR INSTANTANEOUS READINGS.

*2 JOLLY GREEN MAGNET WAS NOT ON FOR 15 MIN. READING. ROSIE & JOLLY GREEN MAGNETS WERE OFF FOR THE INSTANTANEOUS READINGS.

*3 INSTANTANEOUS READING AT THE TOP OF THE RAMP IS FOR THE MAIN PULSE.

Attachment 3

Energy Conservation Program Awards and Recognition

**Department of Energy**
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

Use Energy Wisely

CALL OR WRITE: DOE-FEMP
DR. KAREL KLIMA, P.E.
TELEPHONE: 708/972-2284

October 1990

TO: ENERGY MANAGERS AND COORDINATORS - FEDERAL, PUBLIC AND PRIVATE SECTORS IN ILLINOIS

FROM: THE ENERGY COMMITTEE, DOE-FEMP; THE GREATER CHICAGO COMMITTEE TO USE ENERGY WISELY; THE ASSOCIATION OF ENERGY ENGINEERS CHICAGO CHARTER CHAPTER AND ILLINOIS; THE NATIONAL ASSOCIATION OF POWER ENGINEERS

SUBJECT: 1990 ENERGY CONSERVATION PROGRAM AND REGULAR ANNUAL MEETING, OCTOBER 25, 1990

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The regular monthly meeting will be held Thursday, October 25th at 7:00 p.m. at DOE/ANL, 9800 South Cass Avenue, Building 201, Conference Room 3A, Argonne, Illinois. A gate pass to enter the ANL site is required. Call 708/972-2284 or 708/972-2275 if you plan to attend.

October is "American Energy Awareness Month" in Illinois. The Energy Engineering Awards by the AEE will be presented to:

- Allie C. Mansker, DOE/SLCP
- Julia Langhorn, Geneva, IL
- ENR staff, Chicago Office
- FERMILAB, Batavia, IL

Regional Awards
- William M. Riches, P.E., FERMILAB
- David W. Anderson, CEM Chicago Public Schools

Dr. James P. Hartnett, Director, Energy Resources Center, University of Illinois will discuss during the Technical Program, "Solid Waste Management and Environmental Issues". There will be a Q&A period.

Bring guest(s), your spouse or associates to this annual meeting. (No dinner will be served.)

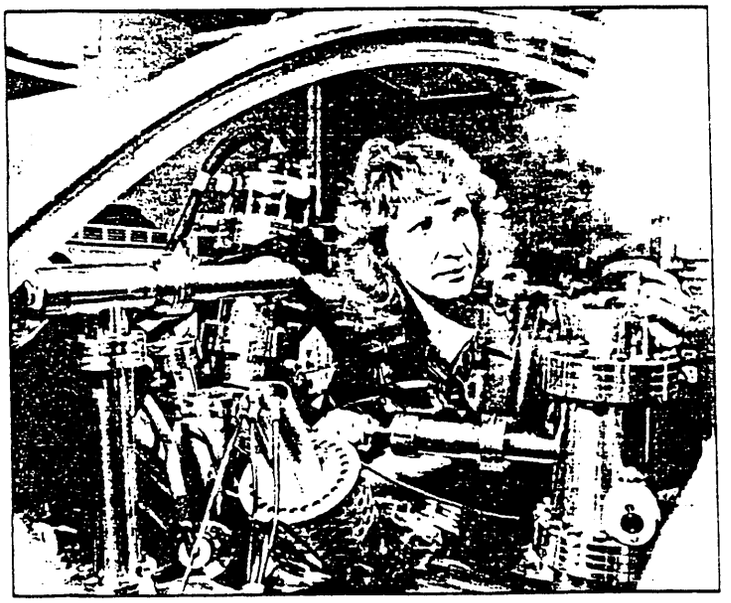
1990 THEME: "ENERGY: PLAN IT ... FOR THE PLANET"

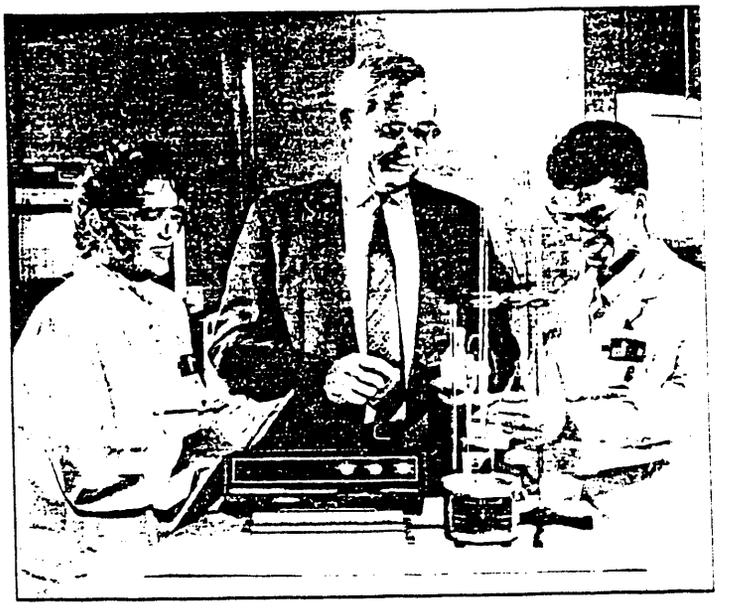
AEE® ACTIVITIES

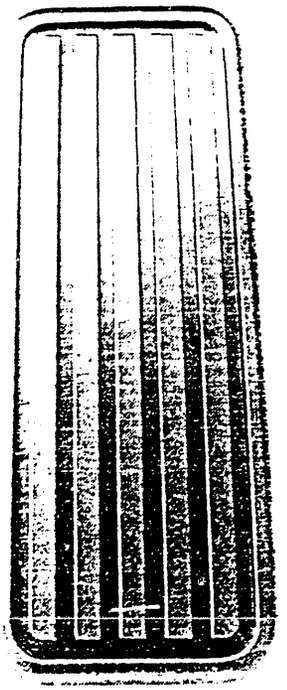
Association of Energy Engineers

# DOE This Month

OCTOBER 1990 | U.S. Department of Energy, Washington, D.C. | Vol. 13, No. 10






## National Ad Campaign



How is it that a country that imports almost half its oil can afford to waste it?

When a little thing like keeping the right pressure in our tires would save America over two million gallons of gas a day. Using lower octane fuels—two and a half million. And driving just five miles per hour slower would save still another two million gallons.

When solutions are this easy there's no excuse good enough.

President Bush hopes you'll do your part, because when you think about it, it's not a lot to do for America.

**DO YOUR PART.**
**DRIVE SMART.**

Ad Council

*The United States Department of Energy*

## Oak Ridge National Lab

# Berkeley Among 33 Winners of Federal Energy Efficiency Awards

DOE's Lawrence Berkeley Laboratory is among the 33 organizations and individuals scheduled to receive Federal Energy Efficiency Awards in a Washington, D.C. ceremony on October 26.

LBL, the only Department 1990 winner and one of three to receive "Special Recognition," is cited for development of an energy management lighting system estimated to produce an annual savings of $670,000.

Other Special Recognition winners in the program, sponsored by the Federal Interagency Energy Policy Committee and DOE, are: Robert G. O'Brien of the U.S. Army, Ft. Belvoir, Va., for initiating a heating plant system for U.S. and foreign stations saving about $100 million in construction costs; and the U.S. Courthouse, General Services Administration, Madison, Wis., for a building energy survey resulting in an annual savings of approximately $980.

Secretary James D. Watkins and J. Michael Davis, Assistant Secretary for Conservation and Renewable Energy, are scheduled to present the awards in a ceremony in the Dirksen Senate Office Building.

The winners, picked from close to 100 nominations, include 12 individuals, 4 small groups, and 17 organizations from the General Services Administration, Army, Navy, Air Force, Marine Corps, Department of Veterans Affairs, NASA, U.S. Postal Service, and the Tennessee Valley Authority.

Winning initiatives included reduced consumption of energy, new equipment and procedures, training programs, and employee awareness programs.

# AWARDS

# In-House Energy Use Drops; Five Awards Scheduled

Energy consumption in DOE buildings dropped 10 percent in FY 1989 compared to FY 85, was down 23.9 percent in metered processes at Department facilities, and deceased 7.2 percent in DOE vehicles and equipment.

The In-House Energy Management (IHEM) Program, which reported the energy savings, also announced IHEM Awards for FY 1989. J. Michael Davis, Assistant Secretary for Conservation and Renewable Energy, will make the presentations at Forrestal Headquarters on October 26. The winners:

**Laboratory** - Fermi National Accelerator Laboratory - for an energy management program including lighting retrofits, conversion to fluorescent lamps, conversion to natural gas heating, and an upgraded employee cash award incentive program.

**Weapons Testing Facility** - Reynolds Electrical & Engineering Co., Inc., Nevada Test Site - for retrofitting existing buildings, lighting surveys on buildings and tunnels, highly effective employee awareness programs.

**Operations Office** - Richland - for superior direction of energy management programs at sites and 11 projects expected to save about $930,000 per year when completed.

**Individuals** - Robert L. Brown, Westinghouse Hanford Co., Richland - for a model energy awareness program emphasizing education and community outreach and numerous energy saving projects estimated to save $980,000 in annual energy and related operating costs. Mark K. Culp - Brookhaven National Laboratory - for managing priorities for electrical equipment loads to meet monthly preset demand targets and chairmanship of the Demand Coordination Committee formed in 1985. Estimated savings under his leadership total $4,650,000.

# Davis To Present 51 Innovation Awards

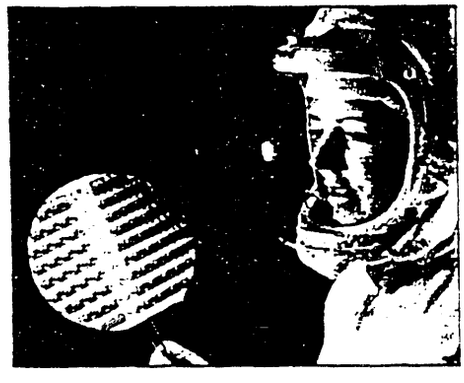
Fifty-one National Awards for Energy Innovation will be presented by J. Michael Davis, Assistant Secretary, Conservation and Renewable Energy, in a ceremony at the Departmental Auditorium, Constitution Avenue, at 2 p.m. on October 10.

The winners, selected from 138 nominations from 38 states, the District of Columbia and America Samoa, will receive certificates signed by Secretary James D. Watkins.

Land O'Lakes, Inc. and GEA Weigand will receive one of two Special Recognition Awards for a mechanical vapor recompression (MVR) system used in the evaporation of whey in cheese production. The MVR system saves the dairy firm $250,000 a year in energy costs and $517,000 in processing costs.

The second Special Recognition Award will go to Michigan State University for use of an existing compressed air system to eliminate the eight-minute warmup period required to operate the brakes and other equipment systems on University buses. The innovation reduces the diesel exhaust emission during warmup by 95%.

The winning projects range from an energy awareness video for school children to an energy efficient ice arena. All winning projects will be listed in detail in a book to be available to the public next spring.

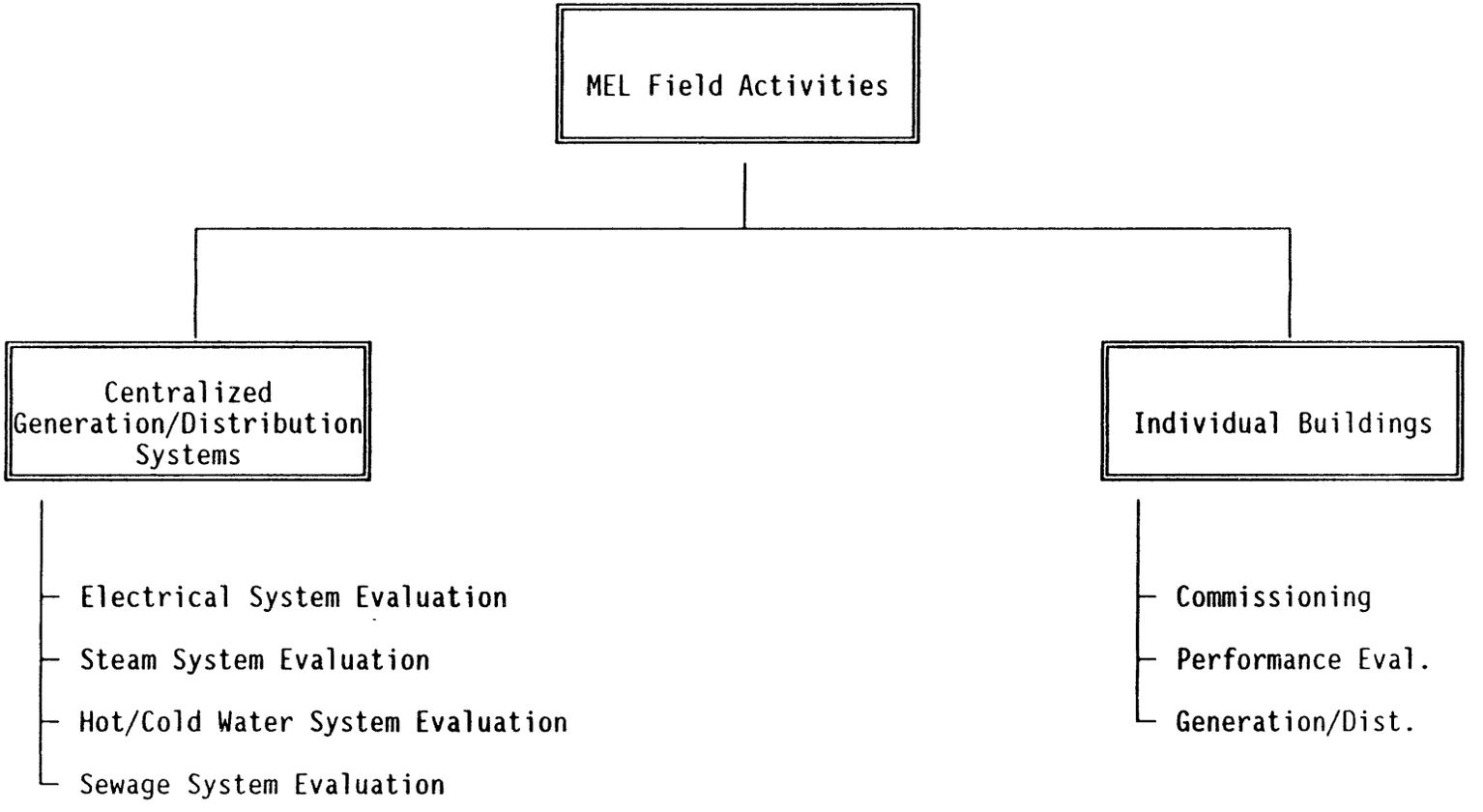


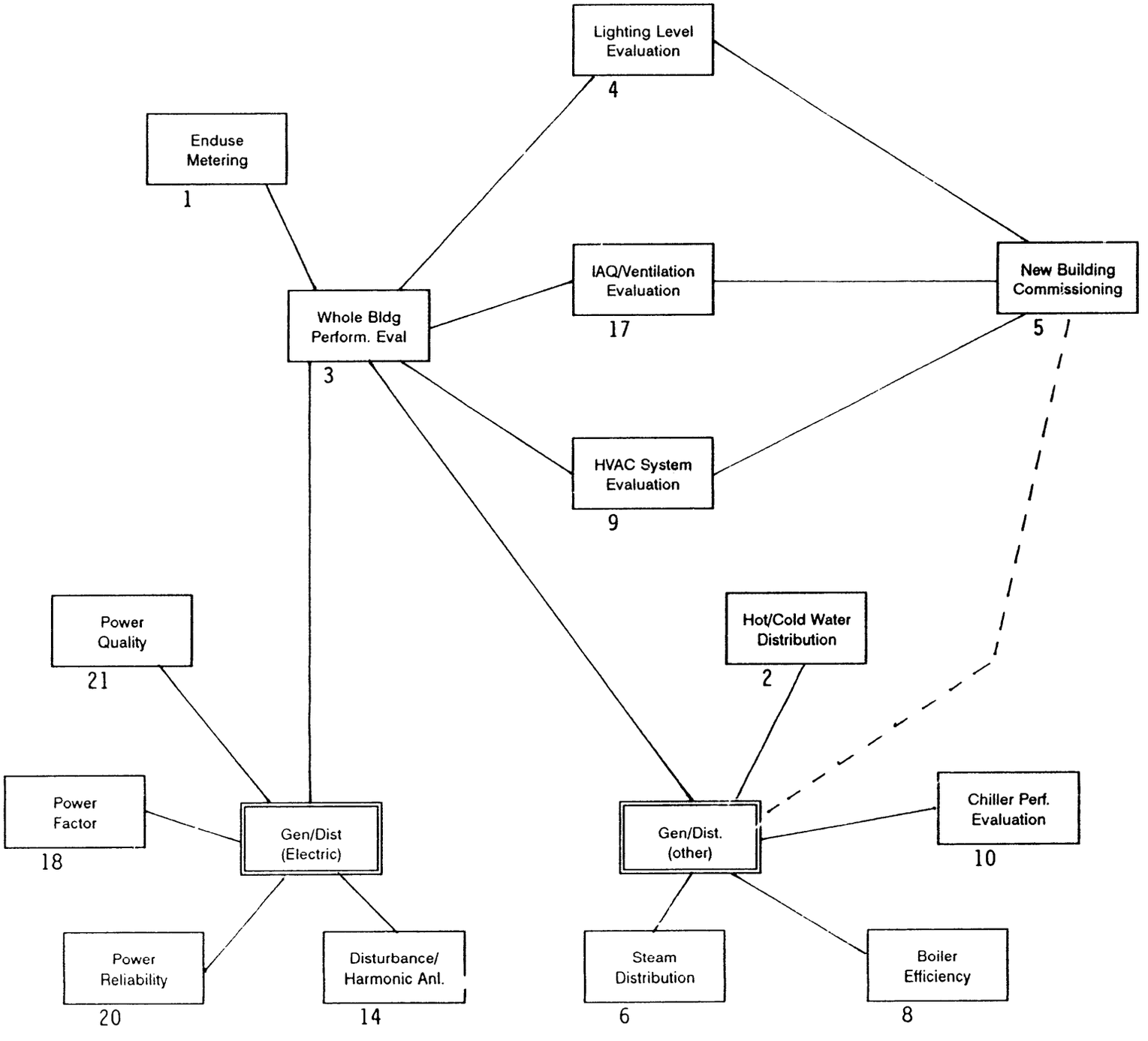
(Sandia Photo by Montoya)

*MS CLEAN — April Howard of Sandia National Laboratories wears a "spacesuit" and helmet as she displays a wafer of semiconductor chips manufactured in Sandia's new Microelectronics Development Laboratory. The lab incorporates a 12,500-square-foot clean room which uses the laminar air flow clean room principle invented at Sandia to make prototype semiconductor chips for weapons, satellites, and spacecraft.*

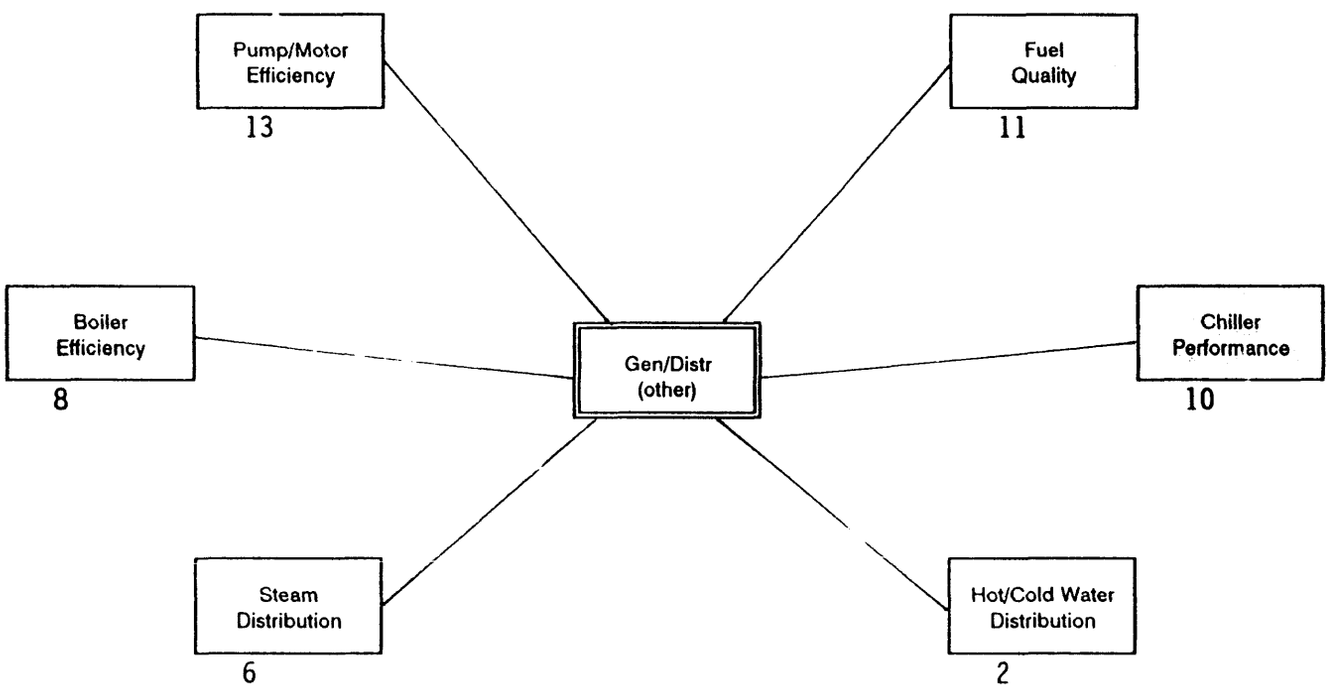
# Attachment 4

## MEL Test Procedure Development Status

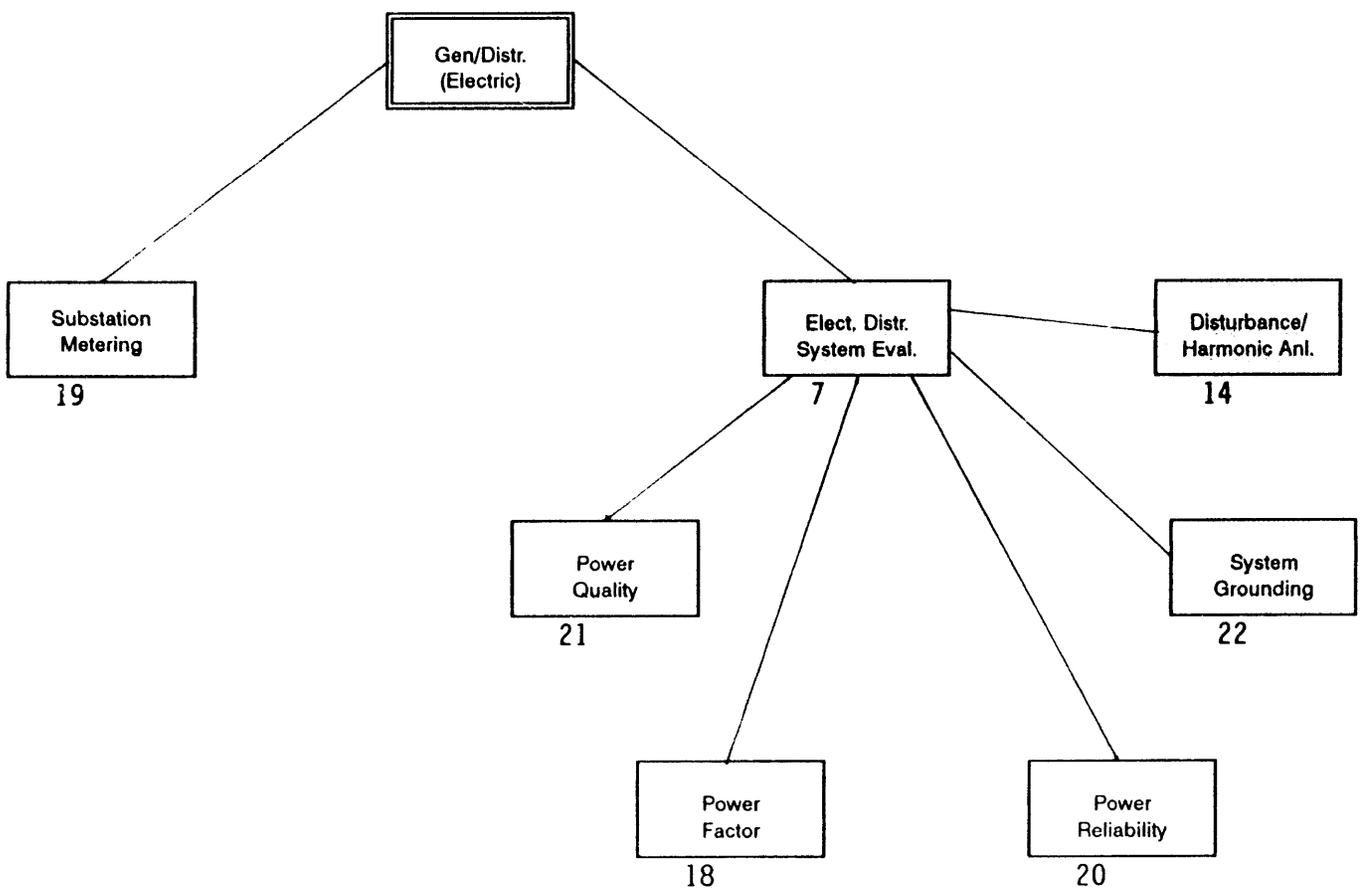

MEL Field Activities
Centralized Generation/Distribution Systems
Individual Buildings
Electrical System Evaluation
Steam System Evaluation
Hot/Cold Water System Evaluation
Sewage System Evaluation
Commissioning
Performance Eval.
Generation/Dist.


Lighting Level Evaluation
4
Enduse Metering
1
IAQ/Ventilation Evaluation
17
New Building Commissioning
5
Whole Bldg Perform. Eval
3
HVAC System Evaluation
9
Power Quality
21
Hot/Cold Water Distribution
2
Power Factor
18
Gen/Dist (Electric)
Gen/Dist. (other)
Chiller Perf. Evaluation
10
Power Reliability
20
Disturbance/ Harmonic Anl.
14
Steam Distribution
6
Boiler Efficiency
8

# Centralized Generation and Distribution System Procedures (Other)



# Centralized Generation and Distribution System Procedures (Electric)



# MEL PROCEDURE DEVELOPMENT

| PR | PROCEDURE TITLE | STATUS | SCHEDULED COMP. DATE | PEND. MAPS | STDS DATE |
|---|---|---|---|---|---|
| 1 | PRO-01 Building Enduse Metering | 1st draft completed | Final 9/30/90 | | 10/90 - ASTM |
| 2 | PRO-02 Hot and Chilled Water Distribution System Evaluation | On hold until MAP requirement | --- | | |
| 2 | PRO-03 Whole Building Performance Evaluation | On hold until MAP requirment | --- | | |
| 2 | PRO-04 Measuring Lighting Levels | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | --- | | |
| 2 | PRO-05 New Building Commissioning | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | --- | | |
| 1 | PRO-06 Steam System Distribution Evaluation | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | Final 3/30/91 | | |
| 1 | PRO-07 Electrical System Distribution Evaulation | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | Final 6/30/91 | | Fall 1991 - ?? |
| 1 | PRO-08 Boiler Efficiency Evaluation | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | Final 6/30/91 | | |
| 1 | PRO-09 Building HVAC System Evaulation | 1st draft completed<br>Copy sent to Blackburn Oct 1990 | Final 1/31/91 | | 3/91 - ASTM |
| 1 | PRO-10 Chiller Performance Testing | In progress<br>Field tested at Hunter AAB | Draft 12/31/90 | | 3/91 - ASTM |
| 3 | PRO-11 Fuel Quality and Delivery Evaluation | On hold until MAP requirement | --- | | |
| | ~~PRO-12 Electric Motor Efficiency Test~~ | ~~cancelled - combined with #13~~ | | | |

# MEL PROCEDURE DEVELOPMENT

| PR | PROCEDURE TITLE | STATUS | SCHEDULED COMP. DATE | PEND. MAPS | STDS DATE |
|---|---|---|---|---|---|
| 2 | PRO-13 Electric Pump and Motor Efficiency Testing | 1st draft in progress | --- | | |
| 1 | PRO-14 Electric Disturbance/Harmonics Analysis | 1st draft in progress | Draft 3/31/91 | | |
| 3 | PRO-15 Temperature Stratification Evaluation | On hold until MAP requirement | --- | | |
| 3 | PRO-16 Controller Evaluation | On hold until MAP requirement | --- | | |
| 3 | PRO-17 Indoor Air Quality and Ventilation Measurement | On hold until MAP requirement | --- | | |
| 1 | PRO-18 Power Factor Determination | New - 1st Draft in Progress | Draft 3/31/91 | | |
| 1 | PRO-19 Substation Metering | Pending | Draft 3/31/91 | | |
| 2 | PRO-20 Power Reliability | New - 1st Draft in Progress | --- | | |
| 2 | PRO-21 Power Quality | New - 1st Draft in Progress | --- | | |
| 2 | PRO-22 System Grounding | New - 1st Draft in Progress | --- | | |

# Attachment 5

## Status of MEL Assignment Plans and Test Reports

MOBILE ENERGY LABORATORY SUSPENSE SCHEDULE (DETAIL) LAST UPDATE: 101590
FOR THE FEDERAL ENERGY MANAGEMENT PROGRAM CONFIRMATION DATE: 121590

Note: Only dates prior to the confirmation date are firm.

| USING AGENCY | DATE | COMP. DATE | ITEM DESCRIPTION |
|---|---|---|---|
| MEL BUS/EQUIPMENT ACTIVITY: | | | |
| ARMY-RFS | 07/30/90 | 071690 | REPAIR AND REMOVE BUS FROM FT. CARSON |
| *DOE -RFS | 10/30/90 | | RECEIVE NEW PURCHASED EQUIPMENT FROM NEESA |
| *DOE -RFS | 10/30/90 | | ORDER ALL TEST EQUIPMENT WITH FY90 FUNDS |
| *DOE -RPM | 10/30/90 | | MOVE BUS FROM NNMC |
| ON-SITE ACTIVITY: | | | |
| ARMY-PRA | 12/15-07/30 | | FT IRWIN TESTS |
| ARMY-RFS | 01/29-01/29 | | REMOVE TEST EQUIPMENT FROM FT CARSON |
| ARMY-RFS | 01/29-04/08 | | FT MCPHERSON TESTS |
| ARMY-PRA | 01/29-08/30 | | FT STEWART TESTS |
| ARMY-RFS | 06/25-06/29 | 092390 | HUNTER AIR FIELD TEST EQUIPMENT INSTALL #2 |
| ARMY-RFS | 01/29-08/30 | | HUNTER AIR FIELD TESTS |
| ARMY-RFS | 02/19-03/01 | | FT LEWIS WINTER TEST EQUIPMENT INSTALL. |
| ARMY-RFS | 02/19-03/01 | | FT LEWIS WINTER TESTS |
| *NAVY-RFS | 03/15-08/30 | | NNMC TESTS |
| *DOE -RPM | 05/14-06/07 | 060790 | FORRESTAL BUILDING TESTS |
| ARMY-RFS | 06/04-06/15 | | FT SAM HOUSTON SUMMER TEST EQUIP. INSTALL. |
| ARMY-PRA | 06/25-06/29 | 071390 | FT RILEY SITE VISIT |
| ARMY-RFS | 06/05-08/31 | | FT SAM HOUSTON SUMMER TESTS |
| *AMC -GBP | 08/29-08/30 | 083090 | LAKE CITY AAP SITE VISIT/PRELIMINARY TESTS |
| *DOT -RPM | 08/30-09/30 | | MERCHANT MARINE ACADEMY TEST #2 |
| ARMY-PRA | 10/15-10/30 | | FTORD-001,-003,-005 TEST EQUIPMENT INSTALL. |
| MAPS/REPORTS: | | | |
| ARMY-GBP | 01/15-01/29 | 100290 | FTLEWIS-002 TEST REPORT |
| ARMY-GBP | 01/15-01/29 | | FTLEWIS-003 TEST REPORT |
| ARMY-GBP | 01/15-01/29 | 072790 | FTLEWIS-005 TEST REPORT |
| ARMY-GBP | 02/19-03/01 | 070390 | CARSON-001 TEST REPORT |
| ARMY-GBP | 02/19-03/01 | 061890 | CARSON-002 TEST REPORT |
| ARMY-GBP | 02/19-03/01 | | CARSON-003 TEST REPORT |
| ARMY-GBP | 03/15-05/01 | 072690 | FTMAC-001 TEST REPORT |
| ARMY-GBP | 03/15-05/01 | | FTMAC-002 TEST REPORT |
| ARMY-GBP | 03/15-05/01 | 082290 | FTMAC-003 TEST REPORT |
| ARMY-GBP | 05/29-06/05 | 060590 | FT ORD MAPS PREPARED |
| ARMY-GBP | 07/16-07/20 | 072490 | FT RILEY INITIAL SITE VISIT REPORT |
| ARMY-GBP | 07/16-09/01 | | IRWIN-001 TEST REPORT |
| ARMY-GBP | 08/01-10/01 | | IRWIN-002 TEST REPORT |
| ARMY-GBP | 08/15-08/30 | 082490 | FT RILEY MAPS PREPARED |
| ARMY-PRA | 09/30-12/01 | | HUNTR-001 TEST REPORT |
| ARMY-PRA | 10/15-12/15 | | HUNTR-002 TEST REPORT |
| ARMY-PRA | 09/30-12/30 | | STWRT-001 TEST REPORT |
| ARMY-PRA | 09/30-12/30 | | STWRT-002 TEST REPORT |
| ARMY-PRA | 09/30-11/15 | | FSAMH-002 TEST REPORT |

* MEL-related activities not funded by FORSCOM

MOBILE ENERGY LABORATORY SUSPENSE SCHEDULE (DETAIL-CONT.) LAST UPDATE: 101590
FOR THE FEDERAL ENERGY MANAGEMENT PROGRAM CONFIRMATION DATE: 121590

Note: Only dates prior to the confirmation date are firm.

| USING AGENCY | DATE | COMP. DATE | ITEM DESCRIPTION |
|---|---|---|---|
| PROCEDURES: | | | |
| ARMY-DLH | 123089 | | WHOLE BUILDING TEST PROCEDURE DRAFT |
| ARMY-DLH | 030190 | 080390 | CHILLER TESTING PROCEDURE DRAFT |
| ARMY-DLH | 063090 | | INCORPORATE SAS COMMENTS INTO PROCEDURES |
| ARMY-DLH | 071590 | | HOT AND COLD WATER DIST. SYS. PROC. DRAFT |
| ARMY-DLH | 073090 | | ELECTRIC MOTOR EFFICIENCY TEST PROC. DRAFT |
| ARMY-DLH | 083090 | | POWER FACTOR DETERMINATION PROC. DRAFT |
| ARMY-DLH | 093090 | | TEMP. STRATIFICATION EVAL. PROC. DRAFT |
| ARMY-DLH | 113090 | | ELEC. DISTURB. AND HARMONICS ANAL. DRAFT |
| OTHER: | | | |
| *DOE -RPM | 050190 | | CHILLER EVALUATION CAPABILITY BRIEF |
| ARMY-JCV | 09/25-09/27 | 092790 | FORSCOM FEDS/MEL REVIEW AT PNL |
| *DOE -RPM | 10/30-10/31 | | FALL 1990 MEL USE COMMITTEE MEETING |
| SAS -WOP | 11/06-11/07 | | FORSCOM ENERGY PROGRAM SEMI-ANNUAL REVIEW |
| *DOE -GBP | 04/03-04/05 | | SPRING 1991 MEL USE COMMITTEE MEETING |

* MEL-related activities not funded by FORSCOM

MOBILE ENERGY LABORATORY SUSPENSE SCHEDULE — LAST UPDATE: 101590
FOR THE FEDERAL ENERGY MANAGEMENT PROGRAM — CONFIRMATION DATE: 121590

Note: Only dates prior to the confirmation date are firm.

| USING AGENCY | SUSP. DATE | COMP. DATE | ITEM DESCRIPTION |
|---|---|---|---|
| ARMY-DLH | 030190 | 080390 | CHILLER TESTING AT PNL & DRAFT PROCEDURE |
| ARMY-RFS | 031889 | | FT LEWIS WINTER TESTS |
| ARMY-RFS | 032089 | | FT SAM HOUSTON WINTER TESTS |
| ARMY-RFS | 040890 | | FT MCPHERSON TESTS |
| *DOE -RFS | 042090 | 062990 | NEW TEST EQUIPMENT SPECIFICATIONS PREPARED |
| *DOE -RPM | 050190 | | CHILLER EVALUATION CAPABILITY BRIEF |
| ARMY-PRA | 051590 | 060890 | FT ORD MAPs PREPARED |
| *DOE -RPM | 060790 | 060790 | FORRESTAL BUILDING TESTS |
| ARMY-PRA | 062990 | 071390 | FT RILEY INITIAL SITE VISIT |
| ARMY-DLH | 071590 | | HOT AND COLD WATER DIST. SYS. PROC. DRAFT |
| ARMY-GBP | 072090 | 072490 | FT RILEY INITIAL SITE VISIT REPORT |
| ARMY-DLH | 073090 | | ELECTRIC MOTOR EFFICIENCY TEST PROC. DRAFT |
| ARMY-PRA | 073090 | | FT IRWIN TESTS |
| *AMC -GBP | 083090 | 083090 | LAKE CITY AAP SITE VISIT/PRELIMINARY TESTS |
| ARMY-DLH | 083090 | | POWER FACTOR DETERMINATION PROCEDURE DRAFT |
| ARMY-PRA | 083090 | | FT STEWART TESTS |
| ARMY-RFS | 083090 | | HUNTER ARMY AIR FIELD TESTS |
| ARMY-RFS | 083190 | | FT SAM HOUSTON SUMMER TESTS |
| *NAVY-RFS | 083090 | | NATIONAL NAVAL MEDICAL CENTER TESTS |
| *ARMY-DLH | 093090 | | TEMPERATURE STRATIFICATION EVAL. PROC. DRAFT |
| *DOT -RPM | 093090 | | MERCHANT MARINE ACADEMY TESTS |
| ARMY-JVC | 092790 | 09/27/90 | FORSCOM FEDS/MEL REVIEW AT PNL |
| *DOE -RFS | 103090 | | RECEIVE NEW PURCHASED EQIUPMENT FROM NEESA |
| *DOE -RFS | 103090 | | ORDER ALL TEST EQUIPMENT WITH FY90 FUNDS |
| ARMY-PRA | 103090 | | FTORD-001, -003, -005 TEST EQUIPMENT INSTALL. |
| *DOE -RPM | 103190 | | FALL 1990 MEL USE COMMITTEE MEETING |
| SAS -WOP | 110790 | | FORSCOM ENERGY PROGRAM SEMI-ANNUAL REVIEW |
| ARMY-DLH | 113090 | | ELEC. DISTURB. AND HARMONICS ANAL. PROC. DRAFT |
| *DOE -GBP | 040591 | | SPRING 1991 MEL USE COMMITTEE MEETING |

* MEL-related activities not funded by FORSCOM

10/01/90

## STATUS OF FORSCOM MAPS

| MAP # | TEST DESCRIPTION | STATUS |
|---|---|---|
| **FORT CARSON** | [Initial Site Visit 01/89] | |
| CARSON-001 | Building 8030 Lighting and End Use Metering | Taking Data Until 06/91 |
| CARSON-002 | Combustion Efficiency/Waste Oil Burn | Equipment Remains 09/90 |
| CARSON-003 | Building 8000 Compressor Evaluation | Taking Data Until 10/90 |
| **FORT LEWIS** | [Initial Site Visit 05/89] | |
| LEWIS-001 | Power Factor at Yakima Firing Range | Unsigned by DEH |
| LEWIS-002 | Electrical Distribution System Profile | Equipment Removed 12/89 |
| LEWIS-003 | Sewage Treatment Plant Profile | Equipment Removed 12/89 |
| LEWIS-004 | Lighting Levels in Building | Unsigned by DEH |
| LEWIS-005 | Commissary Electric Usage Profile | Equipment Removed 12/89 |
| LEWIS-006-R1 | Steam & HTHW Boiler Testing | Testing to Start 01/91 |
| LEWIS-007-R1 | Barracks Heat Demand | Testing to Start 01/91 |
| LEWIS-008 | Helicopter Hanger Retrofit Evaluation | Unsigned by DEH |
| LEWIS-009 | Helicopter Simulation Building Tripout | To be Revised 09/90 |
| **FORT SAM HOUSTON** | [Initial Site Visit 08/89] | |
| FSAMH-001 | Air Conditionor Constroller Evaluation | Equipment Removed 08/89 |
| FSAMH-002 | Chiller Performance Evaluation | Testing to Start 10/90 |
| FSAMH-003 | Hot Water Controller Evaluation | Testing to Start 10/90 |
| FSAMH-004 | Laundry Boiler Combustion Efficiency | Testing to Start 10/90 |
| **FORT IRWIN** | [Initial Site Visit 09/89] | |
| IRWIN-001 | Electrical Distribution System Profile | Testing Started 03/90 |
| IRWIN-002 | Office Building Electric Use Profile | Testing Started 01/90 |
| IRWIN-003 | Office Building Lighting Levels | Testing Completed 12/89 |
| **HUNTER ARMY AIR FIELD** | [Initial Site Visit 10/89] | |
| HUNTR-001 | Electrical Distribution System Profile | Taking Data Until 09/91 |
| HUNTR-002 | Chiller Performance Evaluation | Testing Completed 09/90 |
| **FORT STEWART** | [Initial Site Visit 10/89] | |
| STWRT-001-R1 | Electrical Distribution System Profile | Testing Completed 09/90 |
| STWRT-002-R1 | Main Power Plant Electric Use Profile | Taking Data Until 05/91 |
| **FORT MCPHERSON** | [Initial Site Visit 11/89] | |
| FTMAC-001 | Boiler Combustion/Delivery Efficiency | Equipment Removed 08/90 |
| FTMAC-002 | Building 200 Electric Profile | Testing Started 02/90 |
| FTMAC-003 | Combustion Efficiency Small Boilers | Equipment Removed 08/90 |

| | | | |
|---|---|---|---|
| **FORT GILLEM** | [Initial Site Visit 11/89] | | |
| FTGIL-001 | Warehouse Temperature Stratification | Testing to Start | 01/91 |
| FTGIL-002 | Boiler Shutdown Evaluation | Testing to Start | 01/91 |
| **FORT ORD** | [Initial Site Visit 04/90] | Site Visit Report | 04/90 |
| FTORD-001 | Peak Demand at PX and Meter Calibration | Signed by FORSCOM | 08/90 |
| FTORD-002 | Well Water Pumps Electric Demand | Signed by FORSCOM | 08/90 |
| FTORD-003 | Electrical Distribution System Profile | Signed by FORSCOM | 08/90 |
| FTORD-004 | Hospital End Use Characterization | Signed by FORSCOM | 08/90 |
| FTORD-005 | Hospital Boiler Delivery Efficiency | Signed by FORSCOM | 08/90 |
| **FORT RILEY** | [Initial Site Visit 07/90] | Site Visit Report | 07/90 |
| RILEY-001 | Electricl Distribution System Profile | Signed by DEH | 09/90 |
| RILEY-002 | Chiller Delivery Efficiency | Signed by DEH | 09/90 |
| RILEY-003 | Chiller Cooling Load Determination | Signed by DEH | 09/90 |

10/01/90

## STATUS OF FORSCOM TEST REPORTS

| MAP # | TEST REPORT TITLE | STATUS | |
|---|---|---|---|
| **FORT CARSON** | | | |
| CARSON-001 | Building 8030 Lighting and End Use Metering | Final to Site | 07/90 |
| CARSON-002 | Combustion Efficiency/Waste Oil Burn | Draft to SAS | 07/90 |
| CARSON-003 | Building 8000 Compressor Evaluation | Start Data Anal. | 10/90 |
| **FORT LEWIS** | | | |
| LEWIS-002 | Electrical Distribution System Profile | Draft to SAS | 10/90 |
| LEWIS-003 | Sewage Treatment Plant Profile | Start Data Anal. | 09/90 |
| LEWIS-005 | Commissary Electric Usage Profile | Comments Received | 09/90 |
| LEWIS-006-R1 | Steam & HTHW Boiler Testing | Testing to Start | 01/91 |
| LEWIS-007-R1 | Barracks Heat Demand | Testing to Start | 01/91 |
| LEWIS-009 | Helicopter Simulation Building Tripout | Testing to Start | 09/90 |
| **FORT SAM HOUSTON** | | | |
| FTSAM-001 | Air Conditioner Controller Evaluation | Accepted by Site | 07/90 |
| FSAMH-002 | Chiller Performance Evaluation | Testing to Start | 09/90 |
| FSAMH-003 | Hot Water Controller Evaluation | Testing to Start | 09/90 |
| FSAMH-004 | Laundry Boiler Delivery Efficiency | Testing to Start | 09/90 |
| **FORT IRWIN** | | | |
| IRWIN-001 | Electrical Distribution System Profile | Start Data Anal. | 09/90 |
| IRWIN-002 | Office Building Electric Use Profile | Start Data Anal. | 08/90 |
| IRWIN-003 | Measured Lighting Levels in Four Office Buildings | Revision to SAS | 07/90 |
| **HUNTER ARMY AIR FIELD** | | | |
| HUNTR-001 | Electrical Distribution System Profile | Start Data Anal. | 10/90 |
| HUNTR-002 | Chiller Performance Evaluation | Start Data Anal. | 10/90 |
| **FORT STEWART** | | | |
| STWRT-001-R1 | Electrical Distribution System Profile | Start Data Anal. | 10/91 |
| STWRT-002-R1 | Main Power Plant Electric Use Profile | Start Data Anal. | 06/91 |
| **FORT MCPHERSON** | | | |
| FTMAC-001 | Boiler Combustion/Delivery Efficiency | Comments Received | 09/90 |
| FTMAC-002 | Building 200 Electrical Profile | Start Data Anal. | 11/90 |
| FTMAC-003 | Combustion Efficiency Small Boilers | Comments Received | 09/90 |

**FORT GILLEM**

| | | | |
|---|---|---|---|
| FTGIL-001 | Warehouse Temperature Stratification | Testing to Start | 01/91 |
| FTGIL-002 | Boiler Shutdown Evaluation | Testing to Start | 01/91 |

# Attachment 6

# MEL Equipment Purchase Status

# NEW MEL EQUIPMENT SUMMARY

October 18, 1990

## 1. PURCHASED BY NEESA ($38,900)

PNL provided the following list of new MEL equipment to NEESA on July 3, 1990. Purchase orders were placed in July 1990, before the NAVY's purchase deadline for FY90. But, due to uncertainties in available funds, purchase of the remaining items is on hold. Items recieved by PNL are marked.

| SOFTWARE: | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| WordPerfect 5.1 | 4 | 265 | ■ | |
| WordPerfect Office/Library 3.0 | 4 | 75 | ■ | |
| Borland Quattro Pro | 4 | 300 | ■ | |
| Central Point's PC Tools Deluxe 6.0 | 4 | 150 | ■ | |
| Microsoft QuickBasic 4.5 | 4 | 75 | ■ | |
| Norton Utilities 5.0 | 1 | 150 | ■ | |
| Microsoft Quick C | 1 | 165 | ■ | |
| Lotus GraphWriter | 1 | 350 | ■ | |
| Hewlett Packard Graphics Gallery 3.0 | 1 | 500 | | |
| Lotus Magellan 2.0 | 1 | 150 | ■ | |
| Remote cc:MAIL | 1 | 250 | | |
| Traveling Software Laplink + III 3.0 | 1 | 100 | ■ | |
| Quarterdeck Desqview for 286 | 1 | 80 | ■ | |
| Quarterdeck Desqview for 386 | 1 | 125 | ■ | |
| Mathsoft MathCAD 2.5 | 1 | 300 | ■ | |
| Bloc Publishing FormTool | 1 | 55 | ■ | |
| Quarterdeck QRAM and Manifest 1.0 | 1 | 80 | ■ | |
| Quarterdeck QEMM-386 and Manifest 1.0 | 1 | 100 | ■ | |
| PKWare PKzip & PKunzip 1.02 | 1 | 100 | | |
| MicroHelp Toolbox 1.21 (Basic) | 1 | 80 | | |
| Microcom Carbon Copy Plus + Host | 1 | 100 | ■ | |
| SubTotal | | 6200 | | |

| COMPUTER ACCESSORIES: | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| ALL CHARGECARD 2 | 2 | 300 | ■ | |
| Touchbase WorldPort Fax/Data Modem | 1 | 700 | ■ | |
| Seiko Smart Label Printer | 1 | 200 | ■ | |
| Rolls of labels | 6 | 11 | ■ | |
| Videx TimeWand II | 1 | 700 | ■ | |
| 3.5" floppy drive/controller 1.44MB | 3 | 250 | ■ | |
| NEC Multisync 3D monitor | 2 | 650 | ■ | |
| Paradise VGA 1024i, 512K video card | 2 | 300 | ■ | |
| 100 MB hard drive/controller for AT | 1 | 1000 | ■ | |
| SubTotal | | 6000 | | |

## NEW MEL EQUIPMENT SUMMARY (Cont.)

| OTHER EQUIPMENT | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| ADPI EASI Disk II, 3.5" 1.44MB drive | 1 | 1200 | | |
| Electromatic TI-7H ultrsonic thickness gauge | 1 | 3000 | ■ | ■ |
| Transmation pressure calibration system | | | | |
| Model 1090-21-SS1610G (0-500psi) | 1 | 1575 | ■ | |
| Model 1098P pump (0-200psi) | 1 | 225 | ■ | |
| Model 100830-075 pump (0-3000psi) | 1 | 250 | ■ | |
| Model SS0310G pressure module (0-16psi) | 1 | 500 | ■ | |
| Model SS0610G pressure module (0-100psi) | 1 | 500 | ■ | |
| Model SS2310G pressure module (0-3000psi) | 1 | 500 | ■ | |
| TIF halogen leak detector Model 5500 | 1 | 200 | ■ | ■ |
| Neotronics PCO 961 combustion analyzer | 1 | 3500 | ■ | ■ |
| Bacharach Portable Manometer & acc. | 1 | 100 | ■ | |
| Barcharch draft gauge model 13-7021 | 1 | 50 | ■ | |
| Tegam model 821 thermometer | 2 | 100 | ■ | |
| Tegam phase sequence indicator model T471 | 1 | 75 | ■ | |
| Tegam motor rotation indicator model MR-1 | 1 | 150 | ■ | |
| Solomat Pressure Added 500e Solopac Plus | 1 | 3200 | ■ | |
| 513LWX differential water pressure (5psi) | 1 | 795 | ■ | |
| 514LWX water pressure (0-100psig) | 1 | 795 | | |
| RS500 MPM500e RS232 Adapter | 1 | 325 | ■ | |
| Grant W14-ZD thermostatic bath (0-150C) | 1 | 1526 | ■ | |
| LW14 bath lid | 1 | 157 | ■ | |
| CZ1 immersion cooler (to 0C) | 1 | 797 | | |
| AEMC AC Current Probe 100.253/ JM853 | 6 | 800 | ■ | |
| Synergistics C180 Logger 24" enclosure | 2 | 3000 | ■ | ■ |
| Analog input option | 2 | 900 | | |
| SubTotal | | 32200 | | |

2. PURCHASED BY FEMP ($21,000 of $37,500)

| Description | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| Synergistics C180 Logger 24" enclosure | 2 | 3000 [a] | ■ | ■ |
| Northgate 33MHz, 386 Desktop Computer | 1 | 7200 | ■ | ■ |
| Compaq 286 LTE Laptop Computer With 5.25" drive, modem | 2 | 3500 | ■ | ■ |
| Texas Instruments Laser Printer HP and Postscript compatible | 2 | 2900 | ■ | |
| Cellular Phone | 1 | 450 | ■ | ■ |
| Phone Modem - Cellular Phone Compatible | 1 | 600 | ■ | ■ |

(a) This equipment was purchased for FEMP by separate project funds as payment for rental of existing C180 loggers.

## NEW MEL EQUIPMENT SUMMARY (Cont.)

3. PURCHASED BY PNL ($10,000)

| Description | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| Kodak 150Plus Portable Printer | 2 | 450 | ■ | ■ |
| Bendix/King Portable Radio | 2 | 900 | ■ | ■ |
| DOE Portable Radio Fequency License | 1 | 2400 | ■ | ■ |
| BMI Electric Power Harmonics Analyzer | 1 | 4400[a] | ■ | ■ |
| Power/Hand Tools | - | 500 | ■ | ■ |

4. PURCHASED BY FORSCOM ($17,300 - Reusable Supplies)

| Description | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| C18O Logger Potential Transformers | 12 | 120 | ■ | ■ |
| C18O Logger Communication Modules | 6 | 480 | ■ | |
| Temperature Sensors (Thermocouples) | 24 | 30 | ■ | |
| Current Transformers (Split core) | 293 | 35 | ■ | |
| Misc. Components | - | 2000 | ■ | |

5. TRANSFERRED FROM SAS COE ($21,100 Value)

| Description | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| EMCO FP-100 Flow Computer | 1 | 3000 | | ■ |
| EMCO Turbine Flow Meter Extractor | 4 | 4000 | | ■ |
| EMCO Flow Meter Turbine | 6 | 350 | | ■ |

6. TRANSFERRED FROM DOE ($1,500 Value)

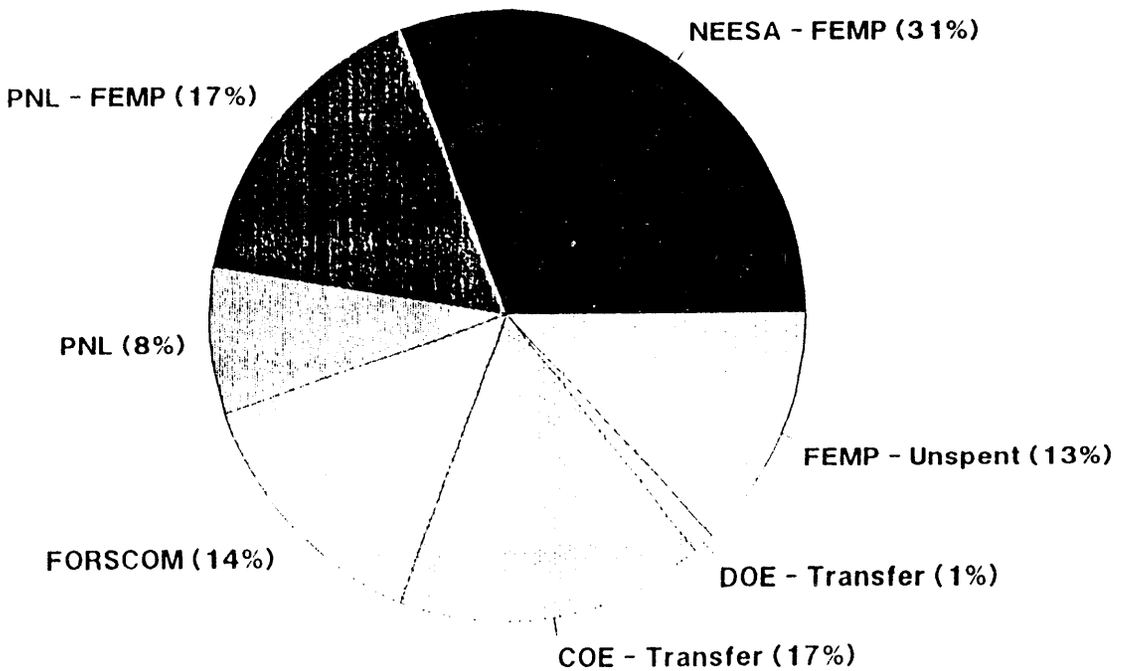
| Description | QTY | $/Unit | Ordered | Received |
|---|---|---|---|---|
| Toshiba 1000 Laptop Computer | 1 | 1000 | | ■ |
| Compaq Dual-Floppy Portable Computer | 1 | 500 | | ■ |

(a) This is a 6 month rental. New equipment cost is $13,000.

# MEL NEW EQUIPMENT PURCHASES

March - October 1990

($126,700)




FEMP Funding = $76.4K, FORSCOM Funding = $17.7K
PNL Funding = $10.0K
COE & DOE Equip Transfers = $22.6K

# Attachment 7

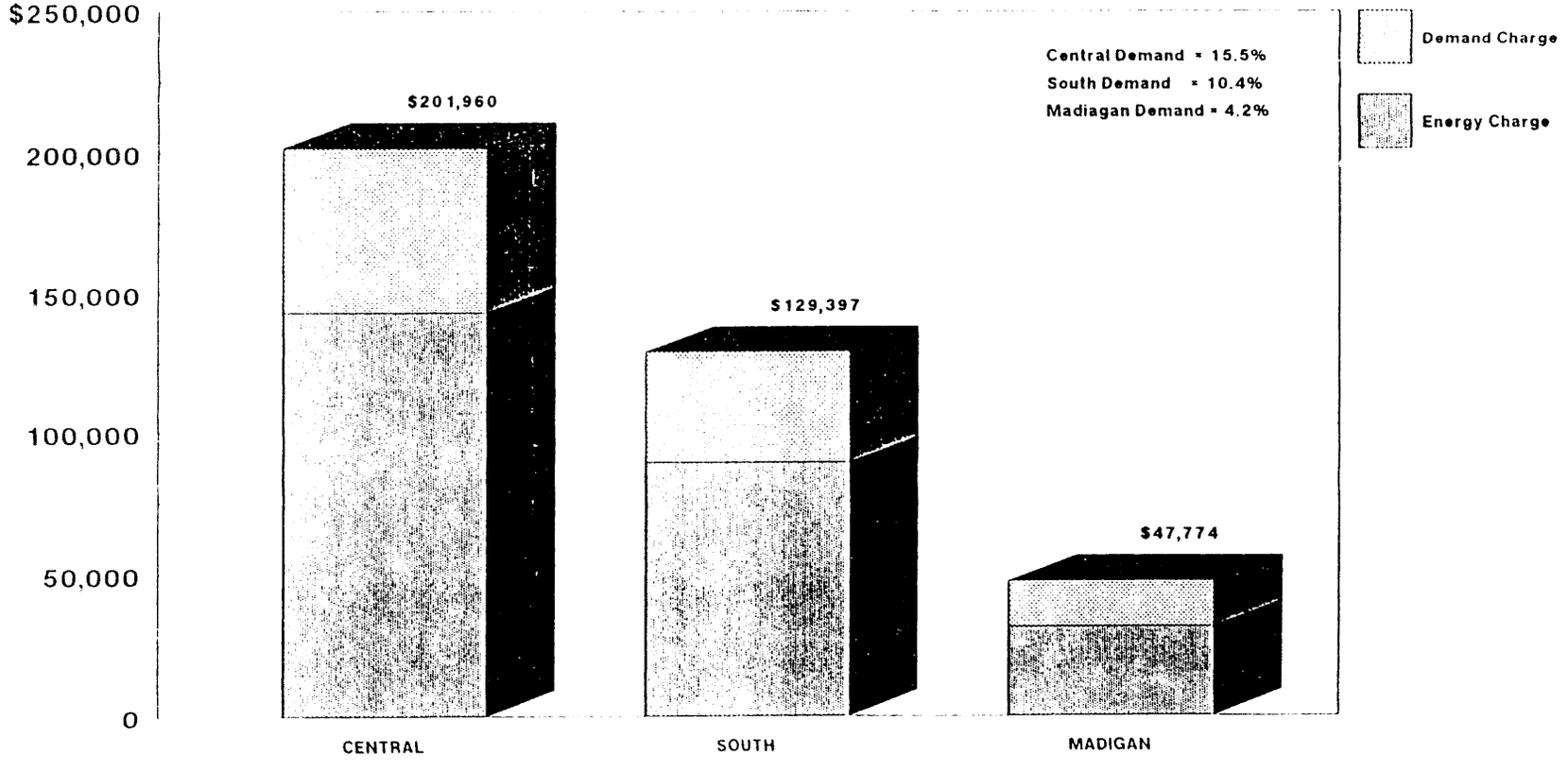
## Summary of Selected MEL/PNL Test Results

# ELECTRIC SUBSTATION MONITORING

- Ft Lewis, WA, Ft Irwin, CA, Ft Stewart and Hunter AAF, GA
- Total substations and all individual feeders
- Measure electric demand and power factor (15-minute) using PNL FDAS and Synergistic C180 loggers
- Results to installation:
  1) Weekday/weekend demand profiles
  2) Weekday/weekend power factor profiles
  3) Expected ranges for each profile
  4) Profile trends during monitoring period
- Recommendations: Add permanent substation metering

# FT LEWIS ELECTRICAL COST COMPONENTS

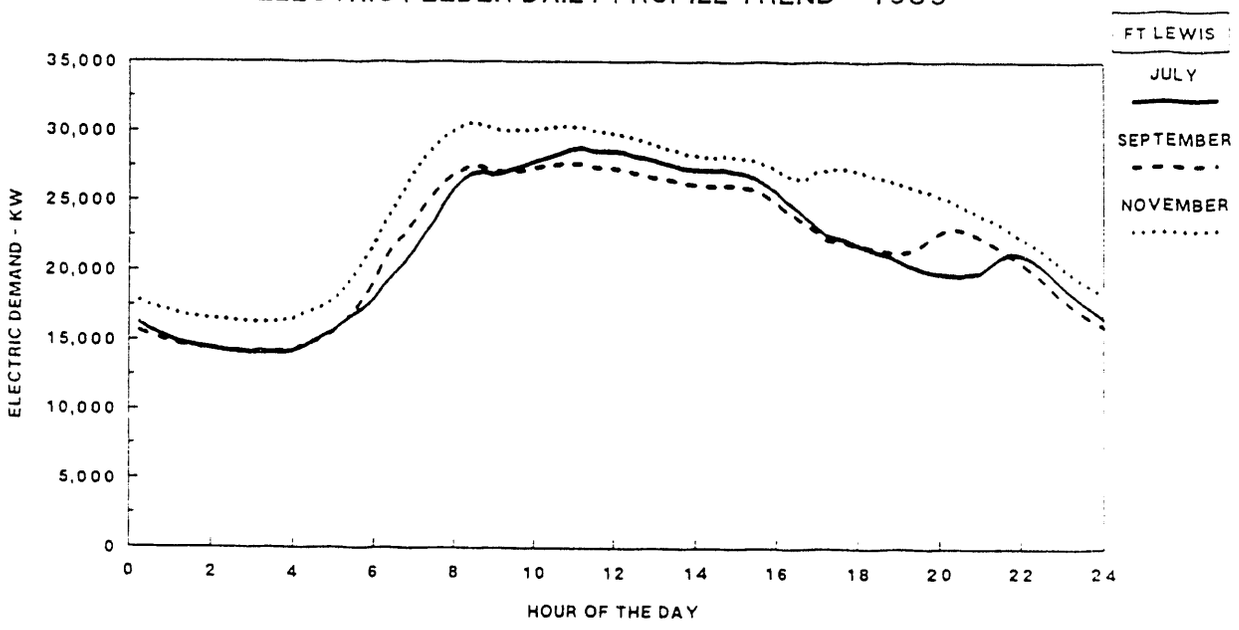
## By Substation/Meter for June 1990




1.41

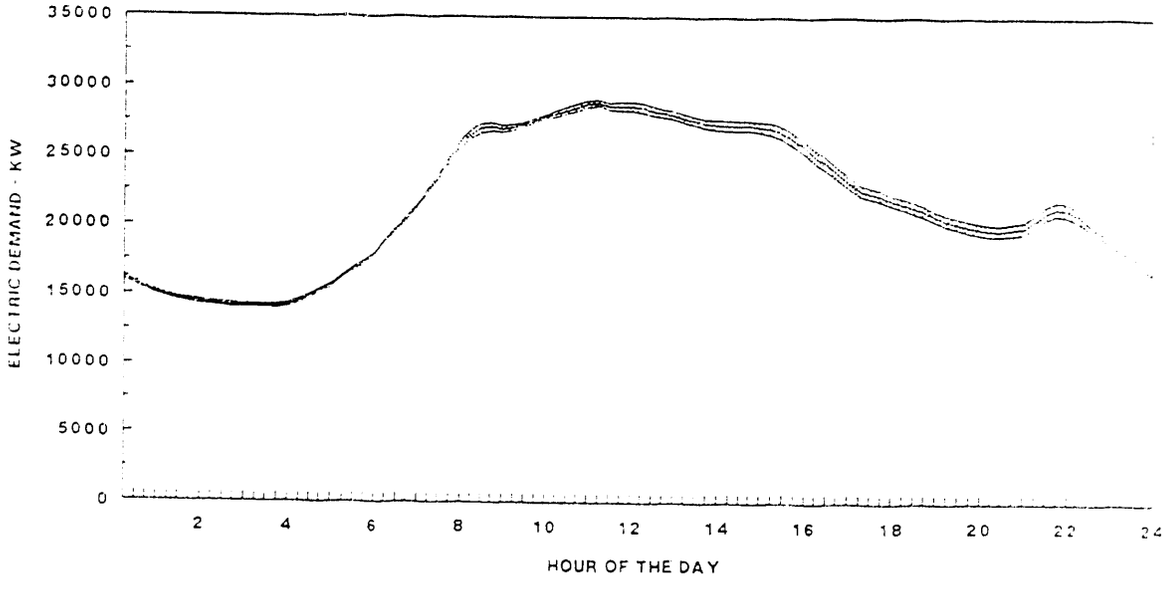
## FT LEWIS, WA - ELECTRIC SUBSTATIONS

### ELECTRIC FEEDER DAILY PROFILE TREND - 1989



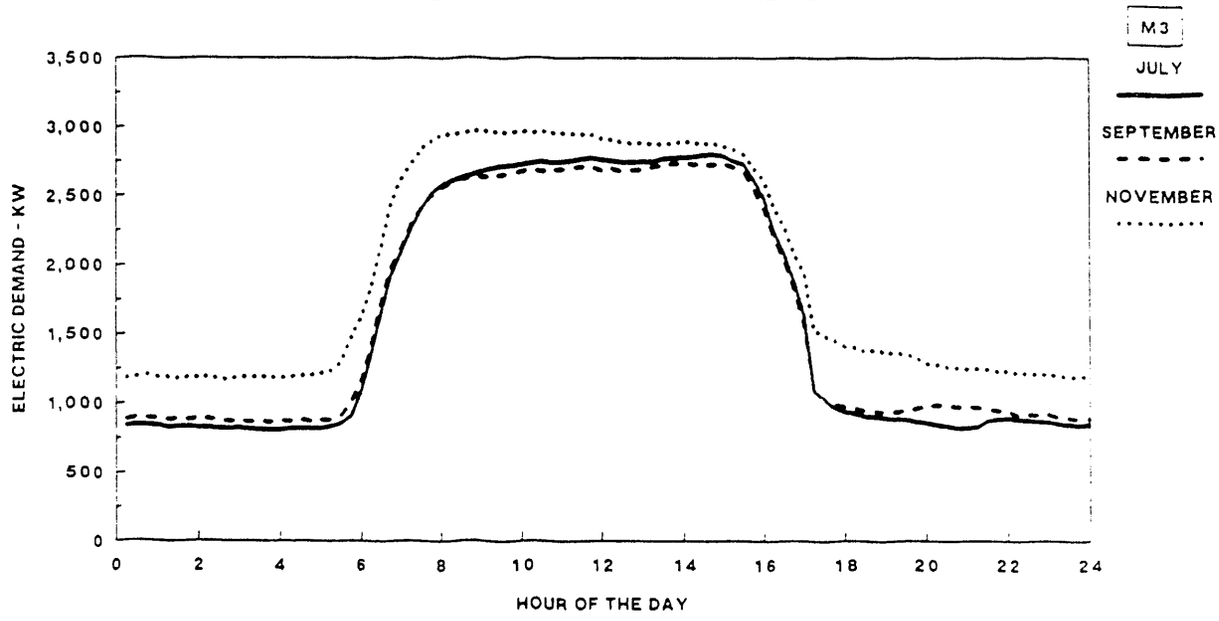

## FT LEWIS, WA - ELECTRIC SUBSTATIONS

### WEEKDAY FOLD (FORT TOTAL) - JULY 1989



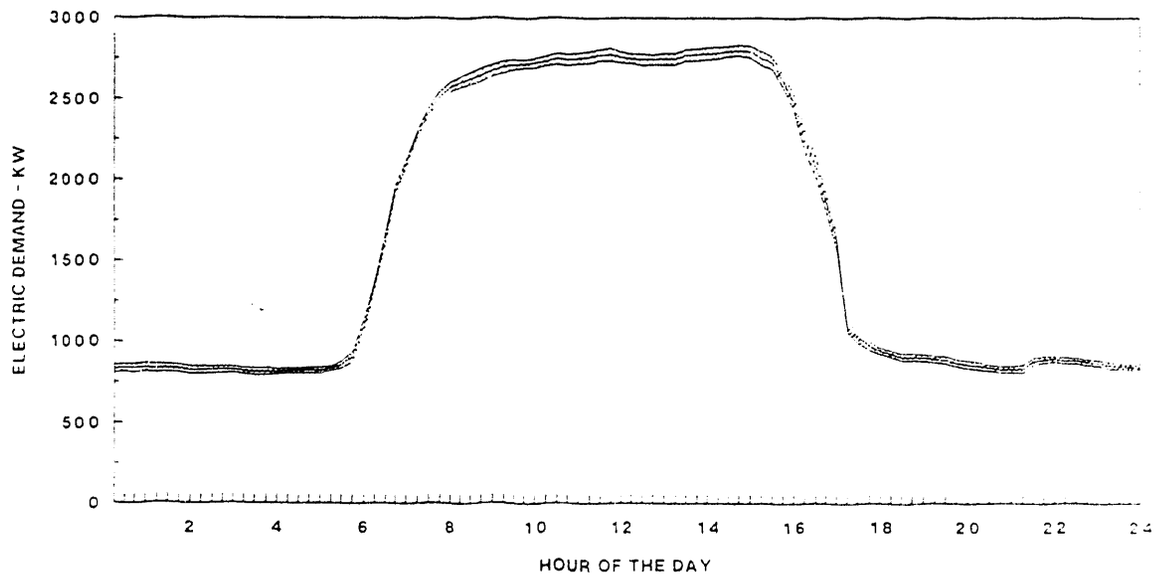
## FT LEWIS, WA - ELECTRIC SUBSTATIONS

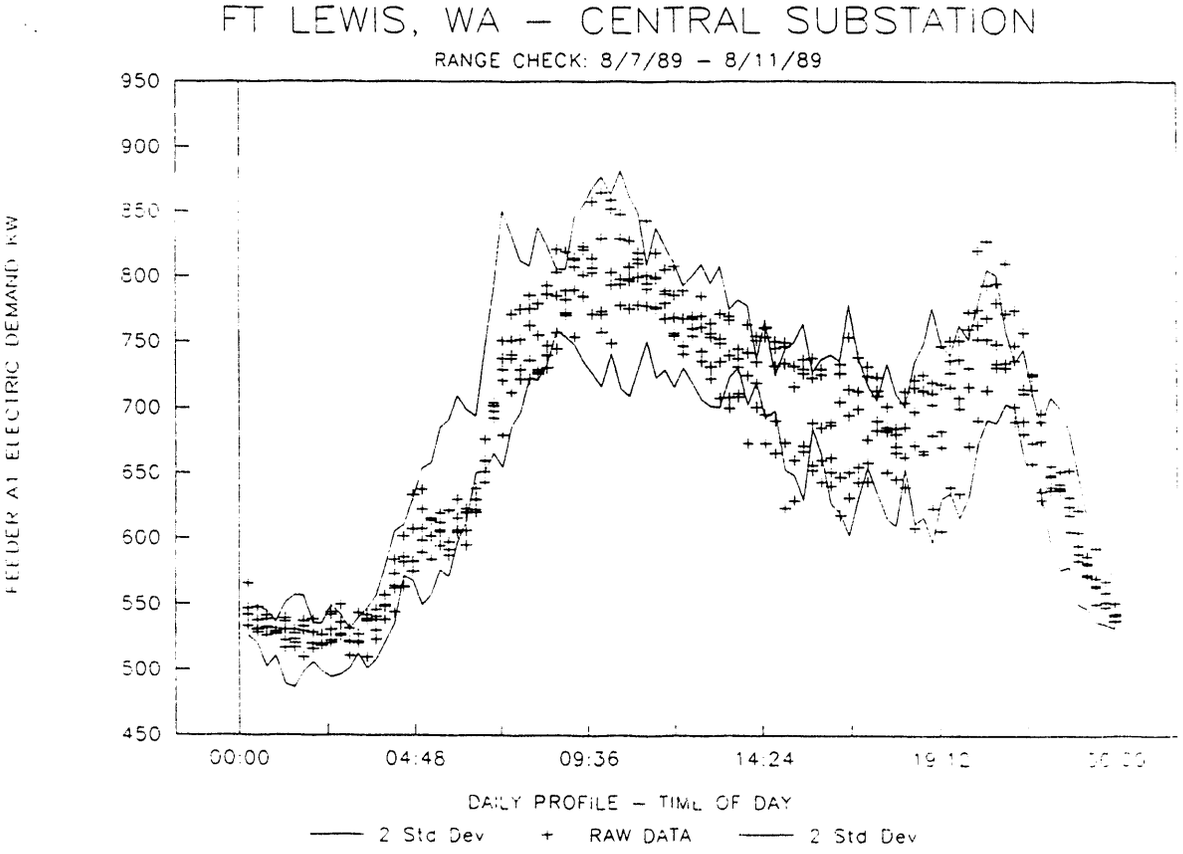
### ELECTRIC FEEDER DAILY PROFILE TREND - 1989

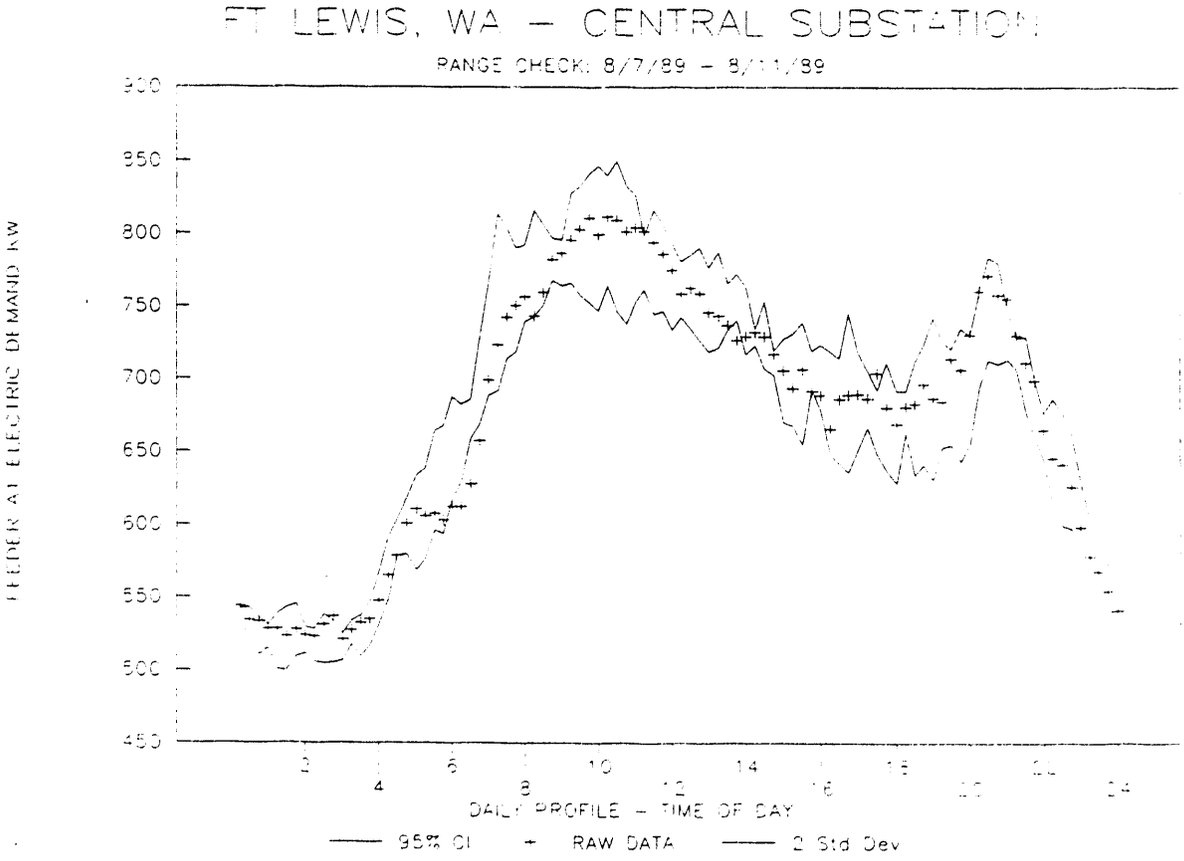


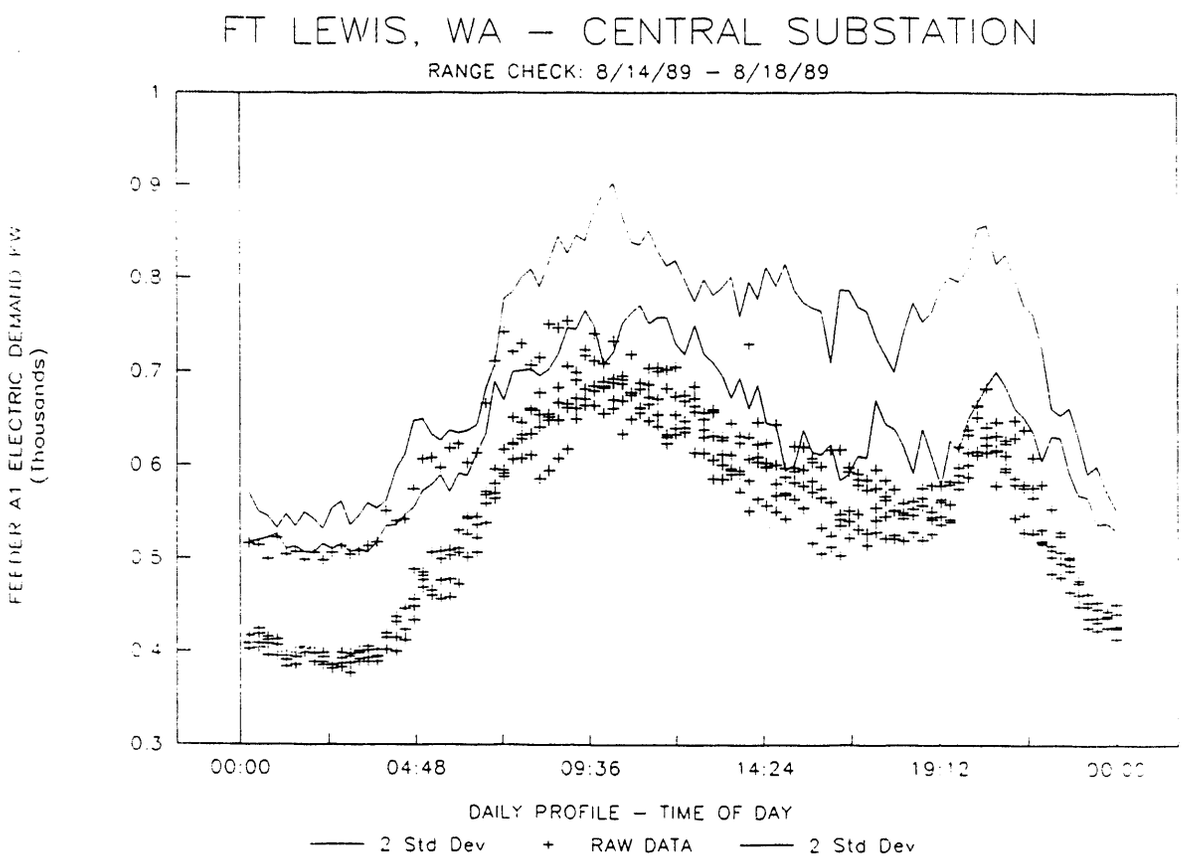

## FT LEWIS, WA - MADIGAN SUBSTATION

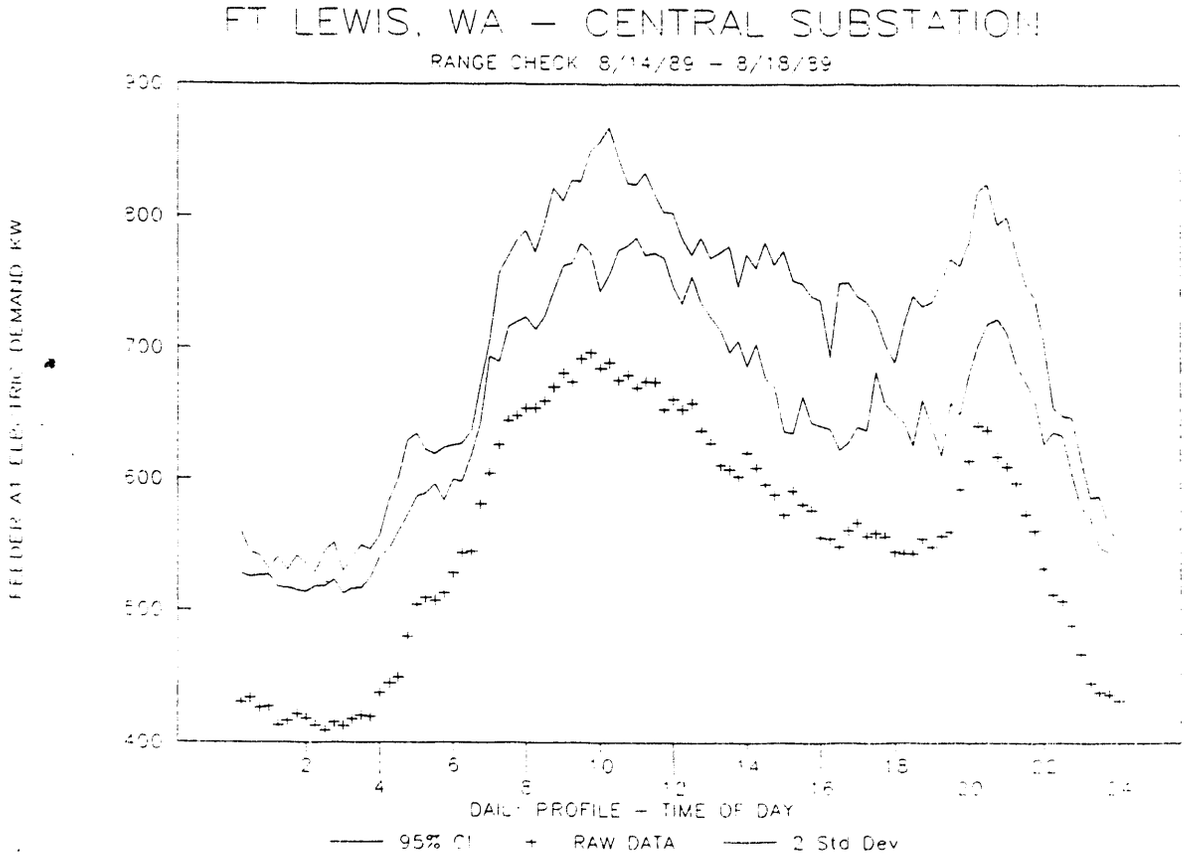
### WEEKDAY FOLD (FEEDER M3) - JULY 1989




FT LEWIS, WA – CENTRAL SUBSTATION
RANGE CHECK: 8/7/89 – 8/11/89
FEEDER A1 ELECTRIC DEMAND KW
950
900
850
800
750
700
650
600
550
500
450
00:00
04:48
09:36
14:24
19:12
DAILY PROFILE – TIME OF DAY
2 Std Dev
RAW DATA
2 Std Dev


FT LEWIS, WA – CENTRAL SUBSTATION
RANGE CHECK: 8/7/89 – 8/11/89
FEEDER A1 ELECTRIC DEMAND KW
900
850
800
750
700
650
600
550
500
450
DAILY PROFILE – TIME OF DAY
95% CI
RAW DATA
2 Std Dev


FT LEWIS, WA – CENTRAL SUBSTATION
RANGE CHECK: 8/14/89 – 8/18/89
FEEDER A1 ELECTRIC DEMAND KW
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
00:00
04:48
09:36
14:24
19:12
DAILY PROFILE – TIME OF DAY
2 Std Dev
RAW DATA
2 Std Dev

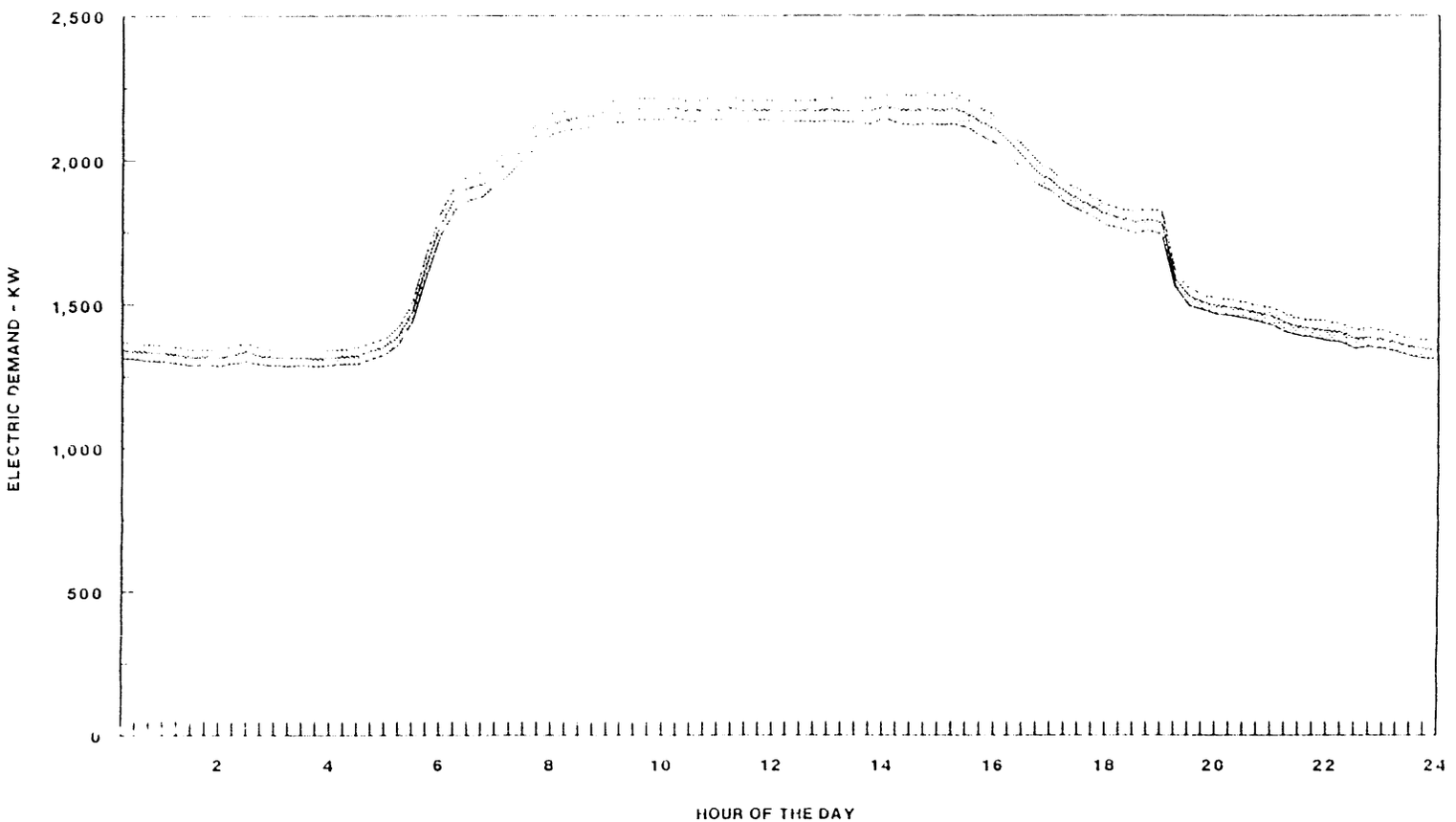

FT LEWIS, WA – CENTRAL SUBSTATION
RANGE CHECK 8/14/89 – 8/18/89
900
800
700
600
500
400
2
4
6
8
10
12
14
16
18
20
22
24
DAILY PROFILE – TIME OF DAY
95% CI
RAW DATA
2 Std Dev

# OFFICE BUILDING ELECTRIC DEMAND MONITORING

- Ft McPherson, GA, building 200 (FORSCOM headquarters)
- 375,000 $ft^2$, all electric (HP heating/cooling)
- Measure electric demand and power factor (15-minute) using 2 Dranetz 808 recording on Techtran 990
- Results to installation:
  1) Weekday/weekend demand profiles
  2) Weekday/weekend power factor profiles
  3) Expected ranges for each profile
  4) Profile trends during monitoring period
- Conclusion: High energy intensity due to high computer loading

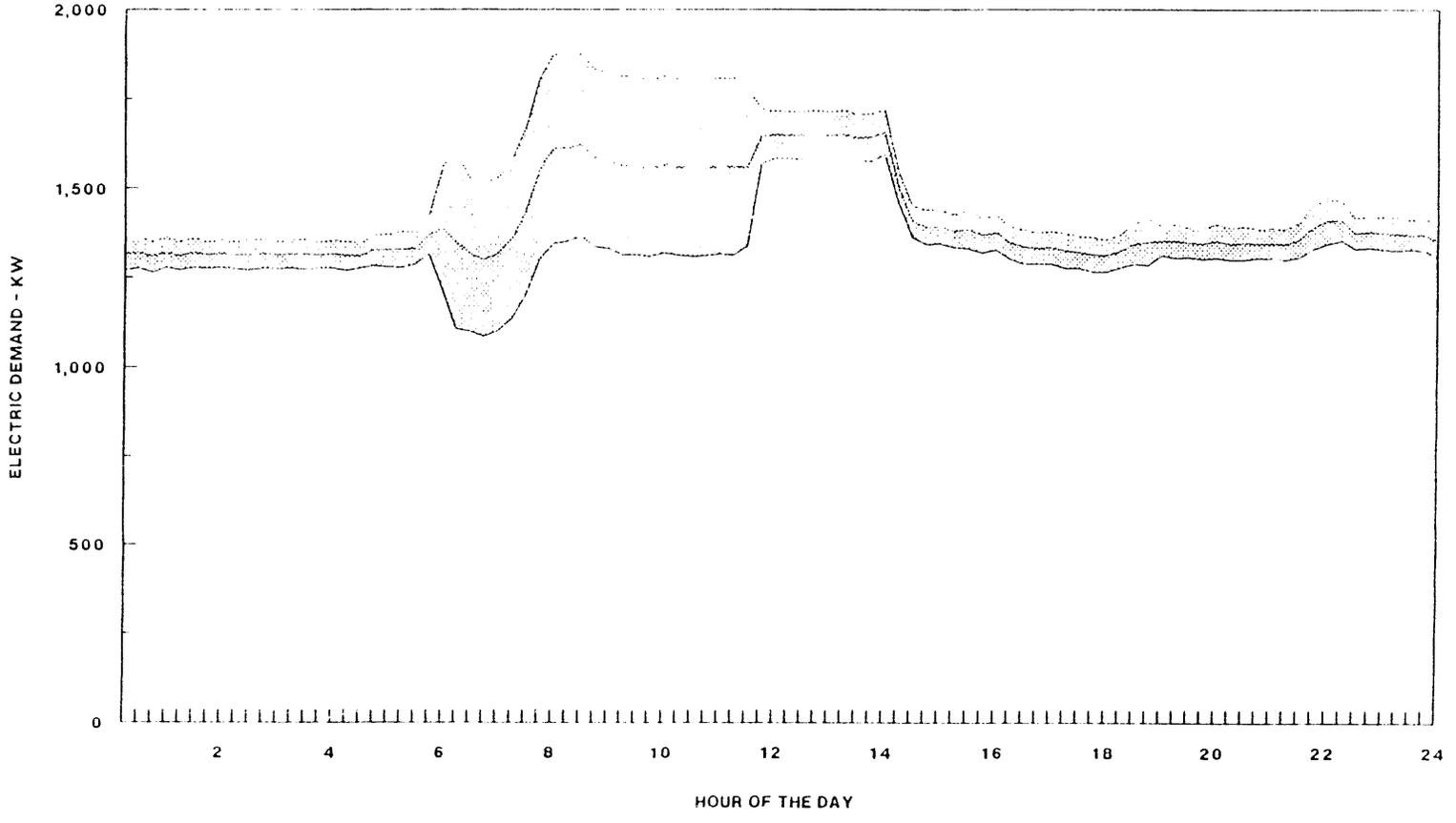
# FT McPHERSON - BUILDING 200

## TOTAL BUILDING - FEB-MAR 1990



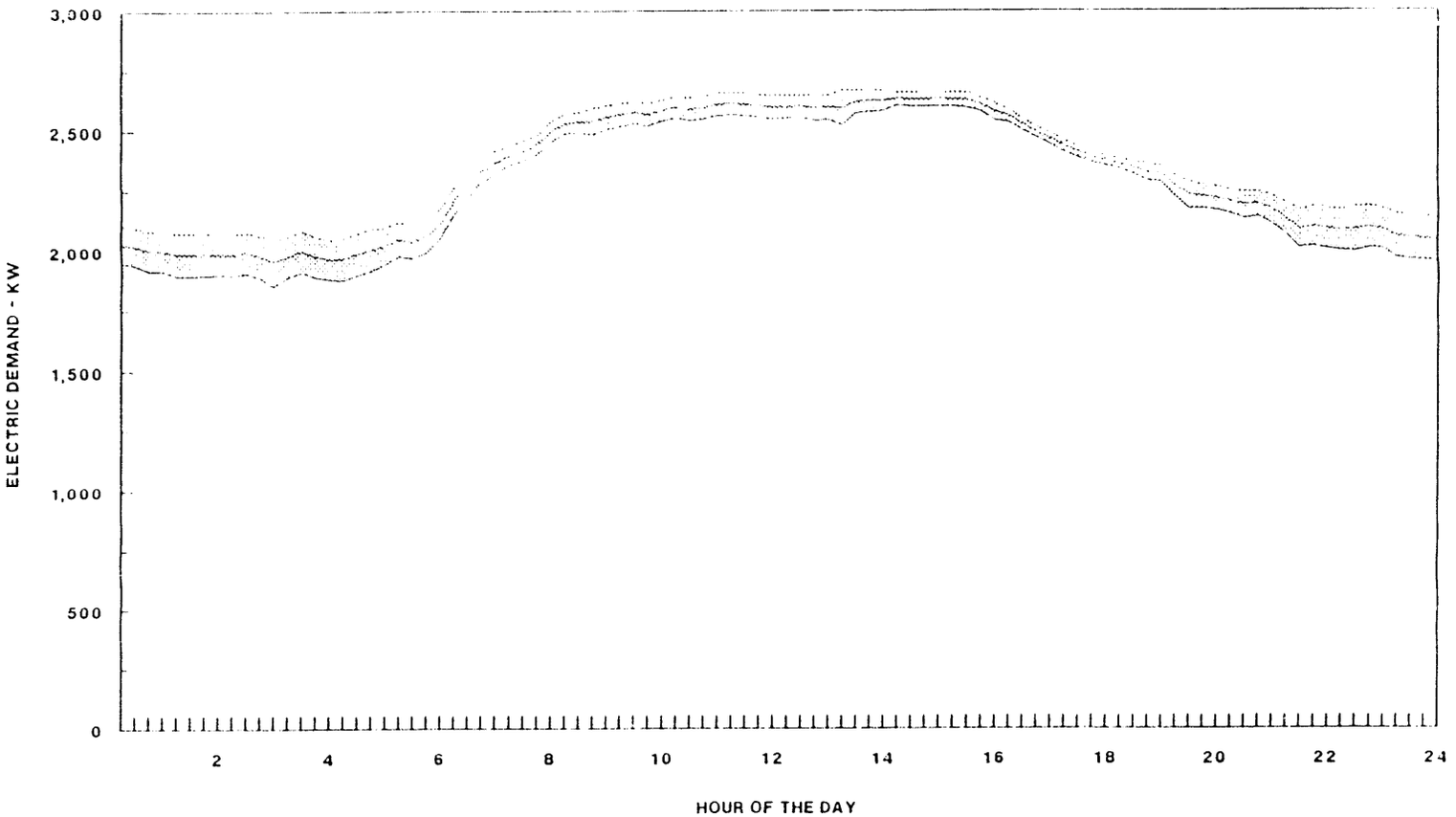
# FT McPHERSON - BUILDING 200

## TOTAL BUILDING - FEB-MAR 1990



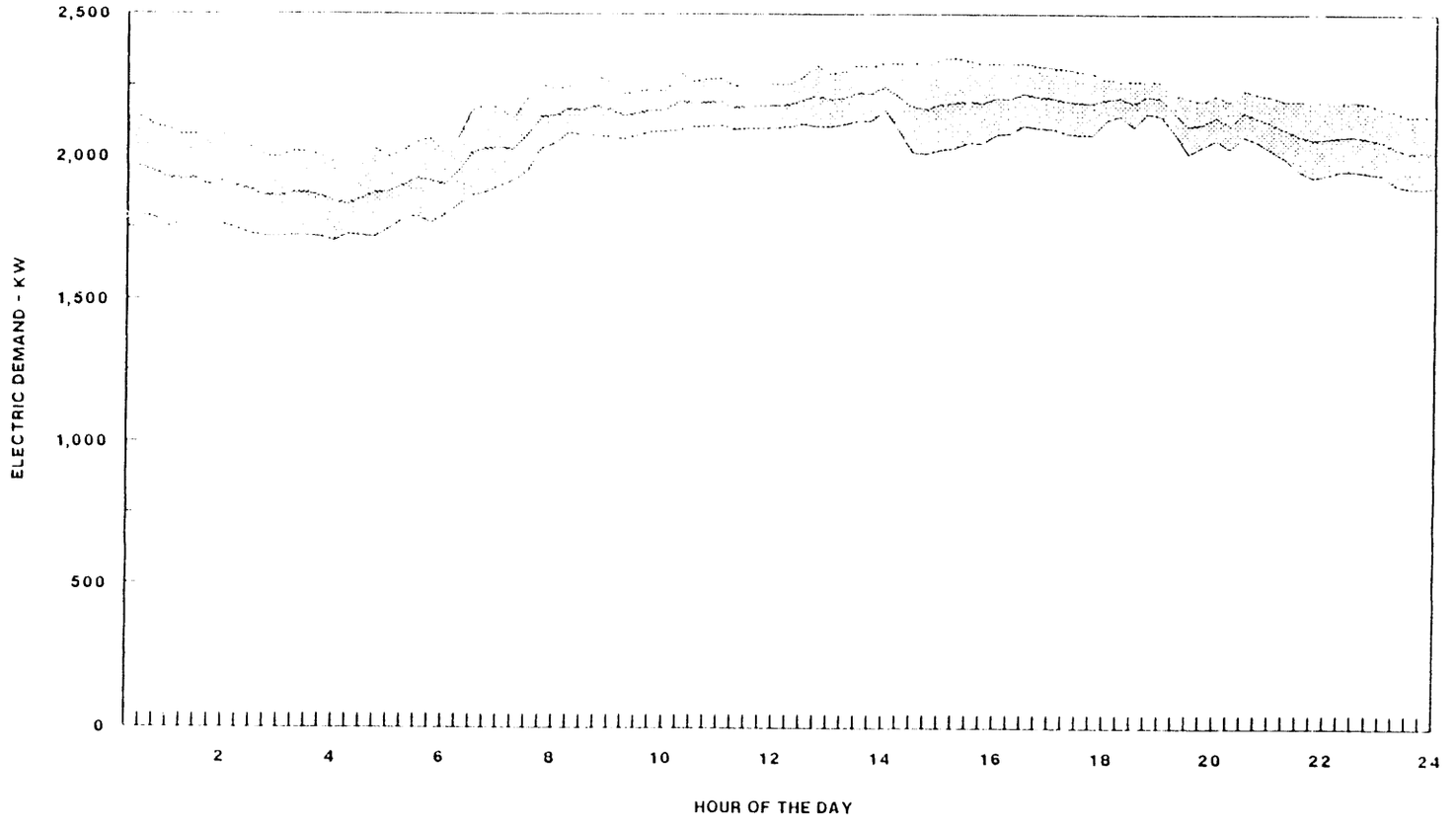
# FT McPHERSON - BUILDING 200

## TOTAL BUILDING - AUG-SEP 1990



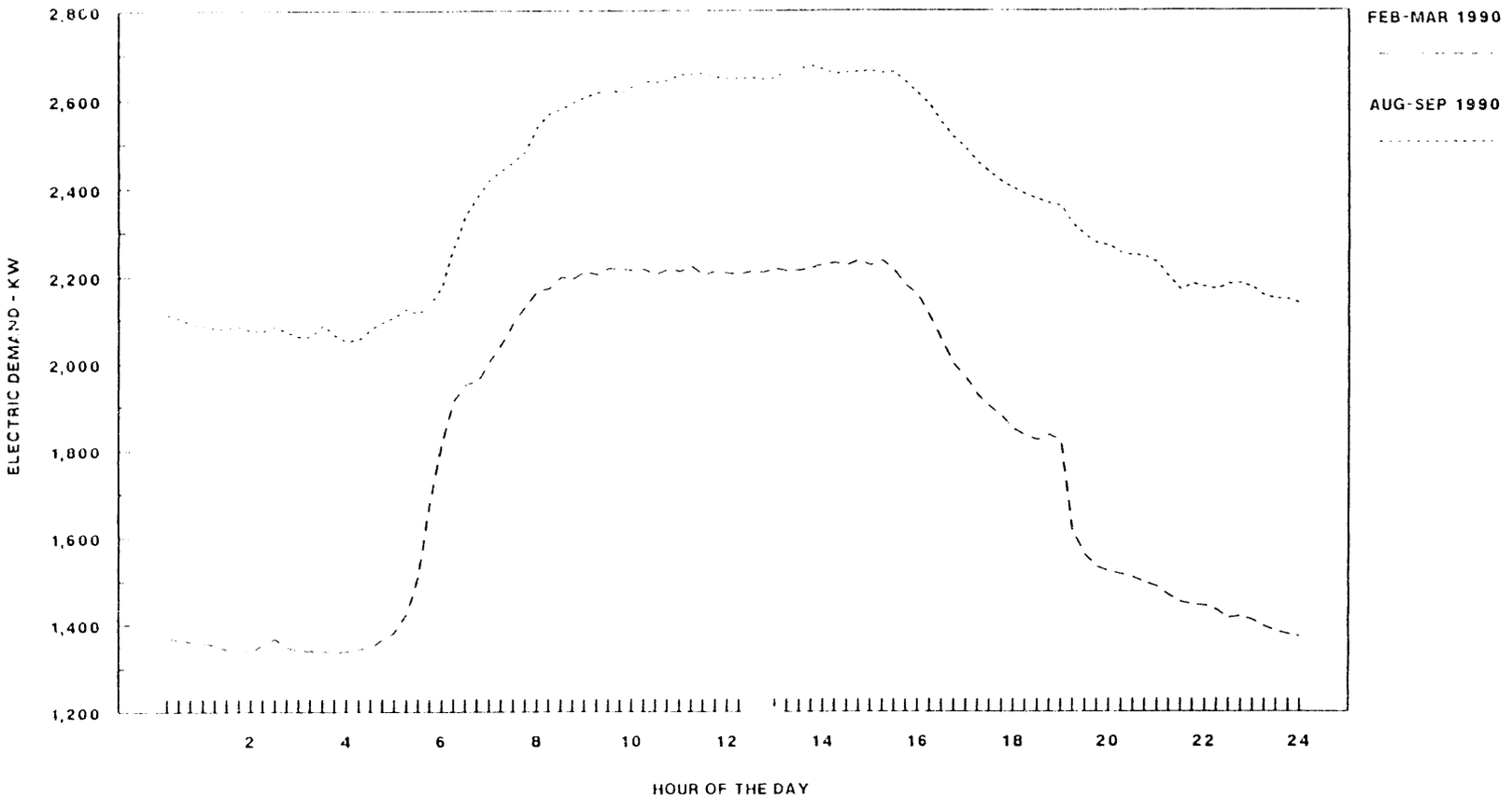
# FT McPHERSON - BUILDING 200

## TOTAL BUILDING - AUG-SEP 1990



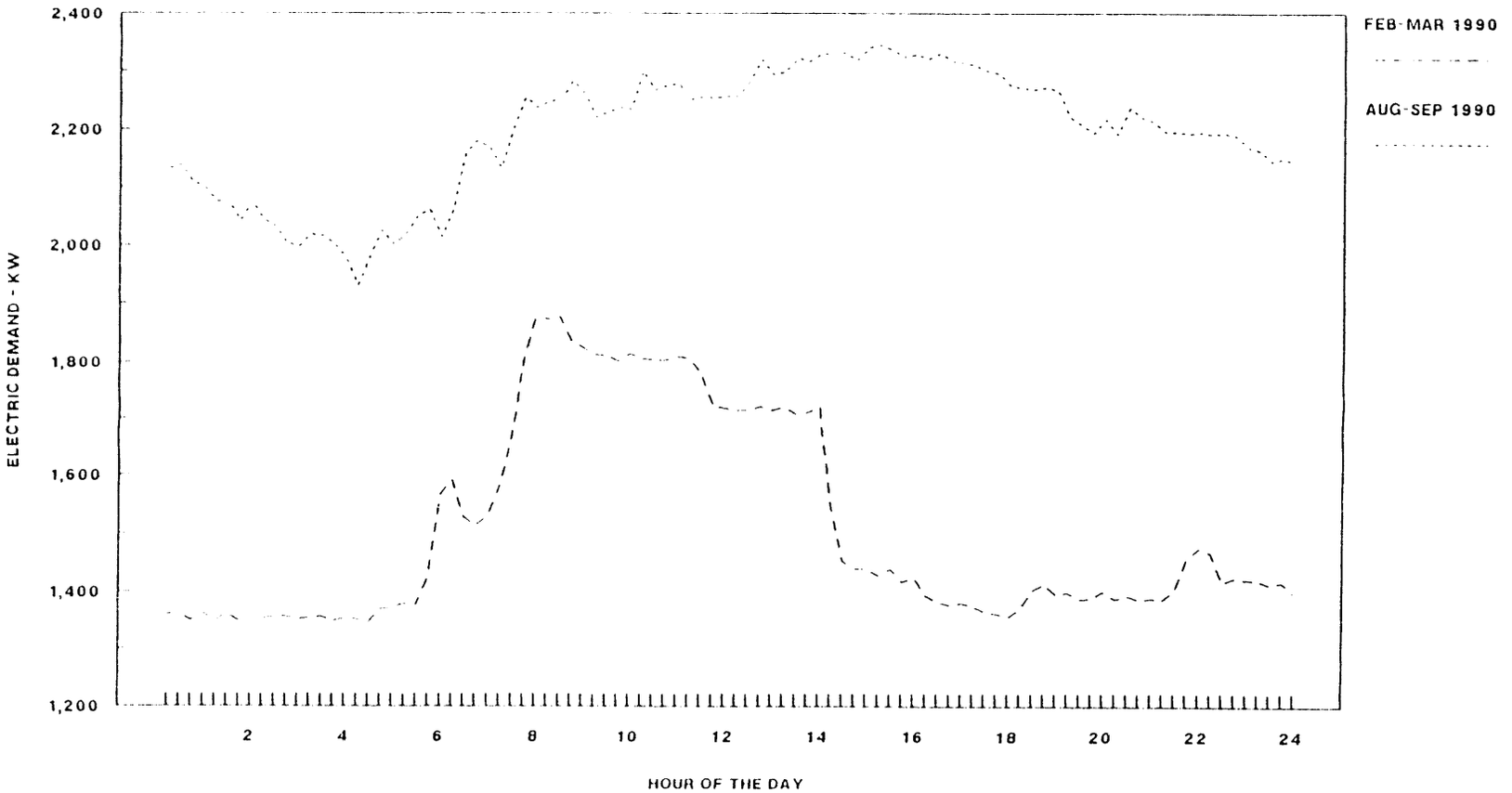
# FT McPHERSON - BUILDING 200

## TOTAL BUILDING WEEKDAY PROFILE TREND



# FT McPHERSON - BUILDING 200

## TOTAL BUILDING WEEKEND PROFILE TREND



# CHILLER TESTING

- PNL, WA, ~~Ft Stewart~~ Hunter AAF, GA, and Ft Sam Houston, TX

- Short term testing of 12 chillers, measurements included:
  Electric power (C180), water flow rates (EMCO), and temperatures (RTDs and Type T TC)

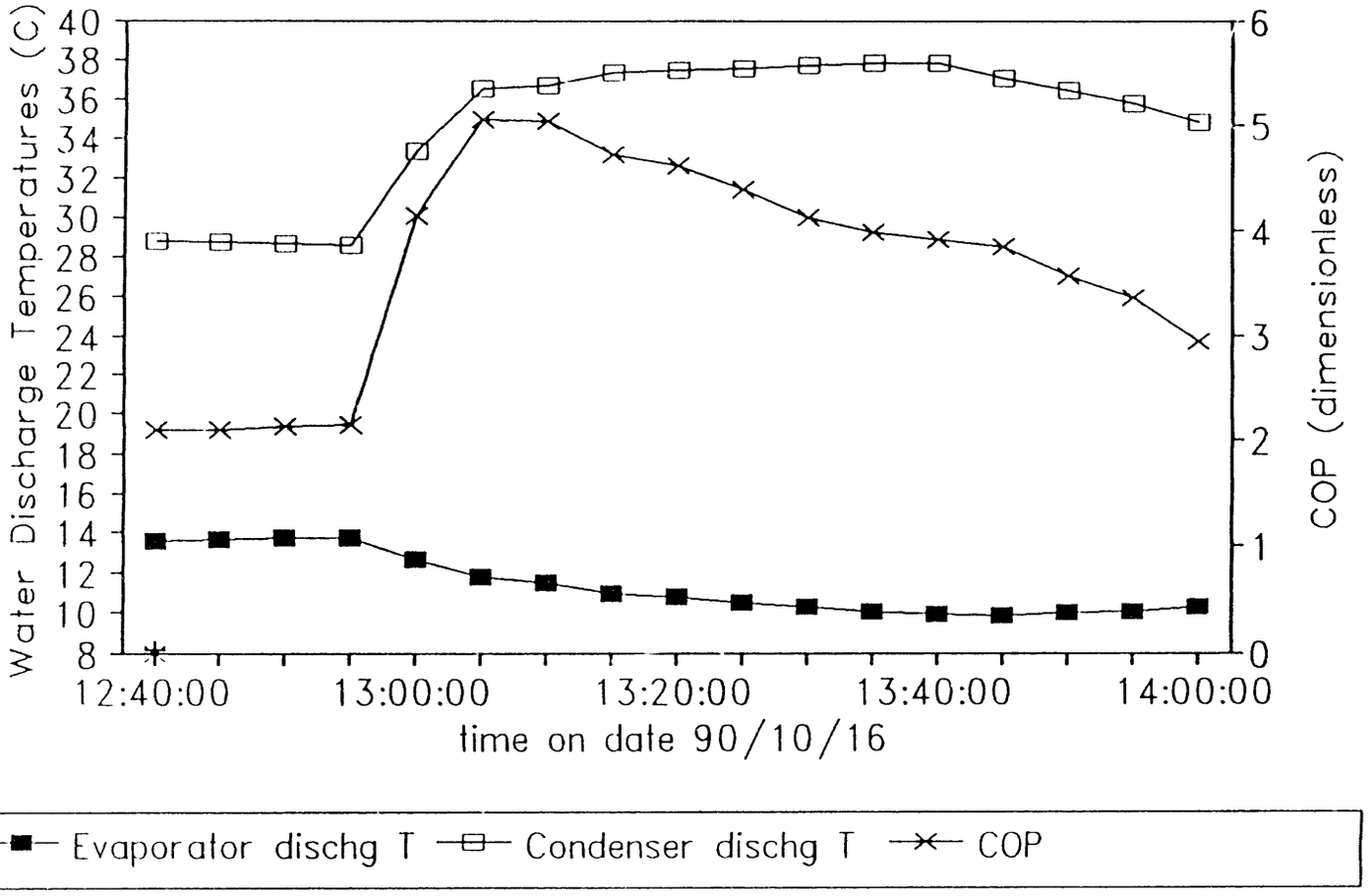
- Test schedule very weather dependent

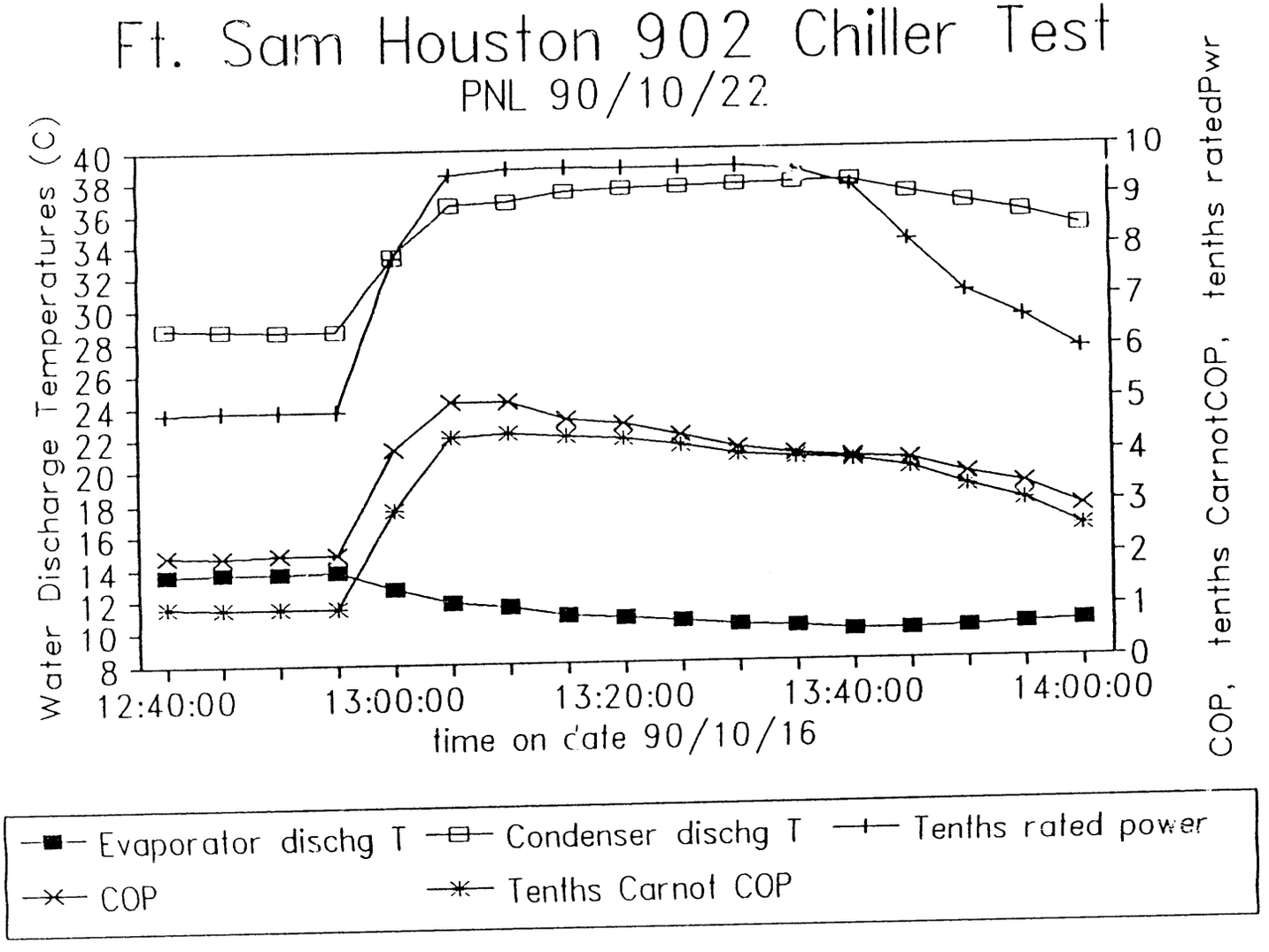
- Results to installation:
  1) Comparison of in-situ eff. to manufacturer's specs
  2) Identification of chillers with very low eff. (low freon)
  3) Determine total load on chiller plant

- Recommendations: Improve O&M
  Provide better operator training

# Ft. Sam Houston 902 Chiller Test

PNL 90/10/22




Ft. Sam Houston 902 Chiller Test
PNL 90/10/22
Water Discharge Temperatures (C)
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
12:40:00
13:00:00
13:20:00
13:40:00
14:00:00
time on date 90/10/16
10
9
8
7
6
5
4
3
2
1
0
COP, tenths CarnotCOP, tenths ratedPwr
Evaporator dischg T
Condenser dischg T
Tenths rated power
COP
Tenths Carnot COP

# SMALL BOILER COMBUSTION EFFICIENCY TEST

- Ft McPherson, GA, barracks buildings
- 10 small steam boilers (0.8-1.5 MBTU/Hr gas input)
- Boilers used for space heating and hot water
- O&M potential: 10% efficiency improvement
  $9,000/yr savings in natural gas (estimate)
- Recommendation: Second test to define gas consumption

| Boiler Location | Combusion Efficiency | Potential Efficiency | Estimated Annual Savings ($) |
|---|---|---|---|
| Building 57- | | | |
| East | 77.7 | 83.0 | 600 |
| West | 73.2 | 83.0 | 1100 |
| Building 59- | | | |
| East | 78.7 | 83.0 | 500 |
| West | 75.0 | 83.0 | 1100 |
| Building 61- | | | |
| East#1 | 73.1 | 83.0 | 1100 |
| East #2 | 72.4 | 83.0 | 1000 |
| East #3 | 71.4 | 83.0 | 1400 |
| West | 83.0 | 83.0 | 0 |
| Building 63- | | | |
| East | 73.7 | 83.0 | 900 |
| West | 74.6 | 83.0 | 1300 |
| | *Average* 75.3 | | *Total* 9000 |

# Attachment 8

## Summary of Selected NEESA Testing Activities

10/24/90

NEESA/MEL ACTIVITIES
THIRD AND FOURTH QUARTER, FY90

DOE Support- Project Manager: Jim Heller

An addendum to the MEL use plan was drafted for presentation at the next committee meeting in Oct. 90. Materials were purchased for DOE Battelle Labs.

EAR - Project Leader - Amelia Duran

Meetings were held with OSD, NAVFAC, Army and Air Force, to discuss current reporting practices, new requirements and plans for updated systems. All services, and OSD, like the specifications and design of our Micro-EAR. Micro-EAR will probably be a model for the entire DEIS-II reporting system. The Air Force reports raw data to DLA, and does not adjust for weather or population. They provide activities with software to generate their own reports, and the only processing of data is to summarize MBtu/ksf by major claimant. Major Claimants are responsible for reporting the data transmitted from the activities on disk.

FY75 to FY90 DEIS II data was downloaded from FACSO to a NEESA micro. Database was optimized and occupies half the memory space occupied on FACSO's computer. Paralleled EAR databases changes during quarterly production of these reports.

ALESP - Project Leader - Carlos Zavala

ALESP was taught at the fourth quarter CECOS class. NCEL agreed that eight of the twenty-two ALESP software modules NEESA reviewed, have serious errors requiring further investigation. They let a contract task to identify if errors exist in the remaining modules, and to document and/or correct the known errors. The task should be completed first quarter FY91.

UTILITIES MANAGEMENT, MECHANICAL SYSTEMS PROGRAM

Program Manager: William Pierce

METERING

NADEP Pensacola - Project Leader - William Pierce

NADEP's goal is to remotely meter each of their facilities. Steam meters were purchased by NADEP in the fourth quarter. Installation is planned for first quarter FY91 with NEESA assistance. We drafted a specification for the electric meters and recorders. These should be purchased end of first quarter FY91.

Marine Corps, 29 Palms - (see attached)

WATERFRONT UTILITIES

PWC San Diego, Variable Speed Pumps - Project Leader - Adam Bartleson

Pier 1 - Pumping station will be moved to pier 6 in FY91, pending SURFPAC approval. We will tune the drive prior to relocating, but repeated mechanical failures in pump components delayed our efforts.

North Island - Attemted to repair a pole on the drive, but will have to replace it instead.

Pier 12 - Our routine inspection identified drive 2 was not starting in bypass mode, and drives 2, 3 & 4 were tripping off. Severe instability and short cycling was observed at 2600 gpm. NEESA and Westinghouse jointly corrected the problems. Our continued involvement has enabled the pumping station to operate successfully for 10 months. The pumping station feeds the drydock, and drydock crews claim they never saw such reliable, steady pressure.

COGENERATION

Cogeneration, MCB Camp Pendleton - Project Leader - Jim Heller

Contracts office received estimates of $40K-$90K to complete the installation. Contracts officer was called to Saudi Arabia prior to completing negotiations. Project on hold.

Cogeneration, NAS Cecil Field - Project Leader - Jim Heller

Provided final report and received favorable comments from customer. Recommended pursuing potential $500K savings using a third party contract. Customer requested NEESA involvement if contract is pursued.

Cogeneration, Naval Hospital San Diego - Project Leader - Jim Heller

Three gas turbines at the Naval Hospital save about $450K/yr, excluding labor to operate them. Labor to operate the turbines is not recorded seperately from the labor required to operate the rest of the boiler/chiller plant. To reduce maintenance requirements, recommended turbines operate at full load, rather than cycling them to a reduced load at off-peak hours. Report expected first quarter FY91.

Cogeneration, NARDAC, San Diego - Project Leader - Jim Heller

Four reciprocating, natural gas fired engines could save $300K/yr provided maintenance requirements were not so excessive. Preliminary indications are that this plant is just breaking even. Metering is required to verify plant operating conditions. Report expected first quarter FY91.

THERMAL ENERGY STORAGE

PWC Norfolk - Project Leader - Rick Mack

Supply system delayed delivery of TRACE software. Delivery expected in Oct. Report completion planned for Nov. 91.

SMALL HYDROELECTRIC

MCB Camp Pendleton - Project Leader - Rick Mack

Small scale hydroelectric power is not economically feasible at this time. Water from the reservoirs is routed to several, rather than one PRV station. Several turbines would have to be installed, and the size of each would be too small to warrant the expense. Cost for electrical tie-in to the base grid further reduces the cost effectiveness, and only one manufacturer of small hydroelectric equipment could be located. As an alternative idea, pumped storage of water should be examined, especially for future reservoirconstruction projects.

UTILITIES MANAGEMENT, ELECTRICAL SYSTEMS PROGRAM

Program Manager: Joe Adams

REMOTE METERING

U.S Army, Fort Bliss - Project Leader - Chuck Zamites -

Lightning strikes halted recorder operation. Local staff is attempting to correct the damage. The Army wants NEESA to monitor the recorder for one year to support their shared savings contract. Final report on energy consumption comparison to baseline equations delayed due to NEESA personnel changes.

NAVHOSP, Great Lakes - Project Leader - Joe Adams - After appearing on the "dirty 30 list" of the EAR, NAVHOSP reversed earlier decision and wants to pursue this project. We informed them of our requirements for their support and have not yet received the support. Project is awaiting NAVHOSP action.

CBC Port Hueneme - Project Leader - Joe Adams - CBC is not actively pursuing this project. We will not put further effort in unless they fund our participation.

PWC Norfolk (Load Shedding) - Project Leader - Joe Adams - Report delayed due to NEESA personnel changes. Report completion expected Nov.91.

SCADA

PWC San Francisco Bay - Project Leader - Adam Bartleson - SCADA system has been operational for 21 months. Numerous software errors have surfaced, but the contractor has repaired most. We will inspect the system in October, and require remaining software errors be corrected. We completed change order for phase 2 modifications. Due to reallocation of funds, award was postponed to first quarter FY91. Planned completion of phase 2 is targeted for Dec. 91. Installed bandpass cavities on system transmitter and receiver. CALTRANS, and CHP have not complained about transmission since the cavities were installed.

SCADA, PWC Guam - Project Leader - Adam Bartleson - No significant progress made. PWC needs to identify portions of the project as either repair by replacement, or new construction.

SCADA, PWC San Diego - Project Leader - Adam Bartleson - We are providing specification and design review in coordination with the Army Corps of Engineers. Recommended incorporating much of the Guam SCADA specification. The Army Corp of Engineers are using an EMCS specification that does not reflect commercially available SCADA technology. Our cost estimate for the 60% design was considerably lower than the designing A&E's cost estimate. We recommended the A&E define and stablize the points list prior to issuing further cost estimates.

UTILITIES INSPECTION

NWC Charleston - Project Leader - Chuck Zamites - Infrared survey completed. Report distributed on time. Favorable comments were received from the customer.

NAVSTA Treasure Island - Project Leader - William Pierce - Funding received, end of FY90. Input base map to Autocad file. Expect to complete project in third quarter, FY91. Project to inspect storm drainage piping, and recommend corrective actions.

Direct Digital Controls (DDC) Carl Swanson

NAVSSES Philadelphia - Installed system

NOMTS White Sands - Design of 100 point system complete. Installation expected in FY91.

NOS Indian Head - Recommended time clocks vs. DDC

DDC Guide Specification - prepared.

DDC Training Class - prepared and presented

DDC systems Installation Monitoring/Troubleshooting - Ongoing

# FY91 Plans - NEESH

* CECC's Energy Manager's Course - schedule NEL

* SCADA - Supervisory Control and Data Acquisition

  Quality control during system design, procurement, installation
  Public works Centers - San Francisco, San Diego, Guam

* Demand Side Management -

  Evaluate state of the art, assess key potential
  FY92 Install RC remote recorders

* DDC Installations -

  6 planned for FY91, [illegible] Navy-wide basis

* Metering -

  Quality control during installation of [illegible]
  at NHDEP Pinnacle
  Plant & trunk line meters design specs NEL

* Variable Speed Pump Drives -

  Ongoing repair & design support, NCC San Diego

* Cogeneration -

  Complete evaluation of natural [illegible]
  @ NAVBASE, San Diego
  Optimize operation of thermal [illegible]
  Complete installation of [illegible]

* Thermal Energy Storage -
  Complete feasibility study, [illegible]

* Power Quality Analysis - initiate program, college [illegible]

* Utilities inspection - inspect steam [illegible]

# Attachment 9

# Other Related MEL Activities at PNL

# MEL-RELATED ACTIVITIES AT OTHER SITES

DOE FORRESTAL BUILDING

- Evaluation of Potential SES Project in Lighting

NATIONAL NAVAL MEDICAL CENTER

- Energy Usage Surveys/Metering and Central Plant Evaluation

MERCHANT MARINE ACADEMY

- Energy Usage Surveys/Metering and Steam Delivery

# MEL-RELATED ACTIVITIES AT OTHER SITES (CONTINUED)

## LAKE CITY ARMY AMMUNITION PLANT

- HVAC System Upgrade; Electrical Distribution System
- Upgrade; Steam Distribution System Upgrade

## U.S. MARINE CORPS/29 PALMS

- Central Power Plant Long-Term On-Line Evaluation for Enhanced Maintenance

## HANFORD SITE

- Building Metering and Steam Distribution System Upgrade Hanford Energy Conservation Program Support

Attachment 10

Draft Abstract and Article for
American Military Engineer Journal

# ENERGY EFFICIENCY TESTING USING THE MOBILE ENERGY LABORATORY

Graham B. Parker
Senior Research Engineer
Pacific Northwest Laboratory
Richland, Washington 99352

Equipment for collecting, recording, reducing and analyzing energy consumption data is being applied at federal installations to test the efficiency of energy conversion and distribution systems, as well as specific energy end-use applications. Mobile Energy Laboratories (MELs) are furnished with ~~the~~ calibrated specialized test equipment, standardized testing procedures, and provide a secure work place when needed at an installation. For most applications, only the equipment is transported to an installation.

The MELs are operated by Pacific Northwest Laboratory[1] (PNL) for the Department of Energy (DOE) Federal Energy Management Program (FEMP) in association with several sponsoring federal agencies, and by the Naval Engineering and Environmental Services Activity. Testing is currently underway at over *[20?]* sites around the country.

The test equipment is used to measure electrical distribution system and end-use energy consumption, steam and water distribution system efficiency, lighting levels, combustion and delivery efficiencies, temperature, humidity, weather, and ventilation and air flow characteristics. Portable computers are used to acquire, process, analyze, and display data for on-site evaluation. Trained PNL engineers and specialists work with installation personnel to identify and conduct tests as appropriate. In addition, PNL is developing standards-society-recognized test procedures for applying the test equipment and conducting the tests. and when appropriate,

Once a test is completed, a test report is prepared that includes recommended actions for improving energy efficiency, ~~along with~~ a life-cycle cost analysis for ~~of any~~ recommended modifications. The test results provide valuable information to the installation decision makers developing overall strategies for managing energy resources and meeting energy reduction goals.

This article describes recent testing activities at ~~four~~ three installations using MEL capabilities. These are: 1) end-use metering evaluation of interior and exterior lighting awareness program in a large multipurpose building at Fort Carson, Colorado; ~~2) measurements of interior lighting levels and lighting energy consumption in representative old and new office buildings at Fort Irwin, California;~~ 2) metering and analysis of the electrical distribution system characteristics at Fort Lewis, Washington; and ~~3~~ 3) *[selected NEESA application]*. The important findings and recommendations based on the test results are summarized.

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[1]Pacific Northwest Laboratory is operated by Battelle Memorial Institute for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830.

10/24/90

## INTRODUCTION

The Mobile Energy Laboratory (MEL) is equipped for testing and evaluation of energy use efficiency at federal facilities. Energy usage metering, testing and analysis equipment is provided to test the efficiency of energy conversion and distribution systems, as well as the various end-use applications. The equipment includes energy end-use metering, steam and water distribution system efficiency, lighting levels, combustion and delivery efficiencies, temperature, humidity, weather, and ventilation and air flow characteristics measurement equipment.

Specific standardized test procedures are developed for common investigations. Specially trained engineers and technicians are provided to conduct tests in a safe and efficient manner with the assistance of host facility staff and contractors. Reports are produced to describe test procedures, results, and suggested courses of action. These reports can be used to justify changes in operating procedures, maintenance efforts, system designs, or energy using equipment. The MEL capabilities can subsequently be used to assess the results of energy conservation projects.

Four MELs were originally configured by the U.S. Department of Energy Federal Energy Management Program (DOE/FEMP). Although the MELs are the property of the DOE, a MEL is principally assigned to each of the following federal agencies: 1) Department of the Army, 2) Department of the Navy, 3) Department of the Air Force, and 4) Department of Energy. The DOE assigns new equipment and upgrades existing equipment as new capabilities are developed. The equipment and trained technicians are made available to federal agencies that provide funding for the direct costs associated with MEL use as identified below.

## TESTING ACTIVITIES

The MELs are currently operated by Pacific Northwest Laboratory (PNL) for the DOE/FEMP in association with several sponsoring federal agencies, and by the Naval Engineering and Environmental Services Activity. Testing is currently underway at over 20 Department of Defense and other federal sites around the country.

Recent testing activities at three installations include:

1) end-use metering evaluation of interior and exterior lighting awareness program in a large multipurpose building at Fort Carson, Colorado;

2) metering and analysis of the electrical distribution system characteristics at Fort Lewis, Washington; and

3) [selected NEESA application].

The tests conducted at each of these sites is described along with the important findings, recommendations and economic and/or energy impact.

Fort Carson Testing

Testing was conducted at Fort Carson during the period of 11 January 1989 to 14 February 1990. The purpose of this MEL test was to monitor electric power consumption and demand in Building 8030 to determine the fractions of total load attributable to interior and exterior lighting and to determine the effects of an interior lighting conservation awareness program and a delamping project involving the exterior lighting system. Building 8030 is a ft2 multipurpose maintenance and office facility

The purpose of the test was to determine lighting's share of the total building electrical energy consumption and peak demand, and to evaluate programs instituted to reduce lighting consumption and demand.

**Test Description and Procedures**

MEL Test Procedure #1 for electrical end-use monitoring was followed. The test involved monitoring electric power demand for all end-use circuits--including interior lighting circuits, exterior lighting circuits and the main power circuit--in Building 8030. The site instituted an interior lighting awareness program on 90/02/02 and an exterior light delamping program on 90/02/01 at Building 8030.

**Test Apparatus and Instrumentation**

A 56-channel field data acquisition system (FDAS) and 48 current transformers (CTs) were installed in Building 8030. Data were collected remotely at PNL over a dedicated telephone line during the period of monitoring.

**Results**

**Interior Lighting.** Figure 1 shows the weekly energy consumption totals and weekly peak 15-minute demands for interior lighting. Note that lighting consumption tended towards the pre-awareness program levels after the initial reduction in early February 1989. This shows the need to periodically remind occupants that the conservation program is being taken seriously by management. The renewed emphasis on lighting awareness after mid-July 1989 is apparent in weekly lighting consumptions for the last half of the year shown in Figure 1.

Figure 2 shows weekday and weekend average day profiles

before and after initiation of the lighting awareness program. Consumption during the period 89/02/02-89/03/24 averages 4.3 kW and consumption during the period 89/01/01-89/02/01 averages 10.9 kW. This indicates that a 60% savings in electrical consumption resulted from the lighting conservation program. The corresponding reduction in peak 15-minute demand cannot be determined from the average profiles, however analysis of the raw data shows that the peak demand during the period 89/02/02-89/03/24 was 14.3 kW and that the peak during the period 89/01/01-89/02/01 was 14.5 kW. The reduction in peak demand is therefore less than 2%.

| Energy Consumption | | | Peak Electric Demand | |
|---|---|---|---|---|
| Before | After | | Before | After |
| 10.8 | 4.3 | avg kW | 14.5 | 14.3 kW |
| 95 | 39 | MWh/yr | | |

**Exterior Lighting.** Figure 3 shows the weekly energy consumption totals and weekly peak 15-minute demands for exterior lighting around Building 8030. Figure 4 shows weekday and weekend average day profiles before and after the delamping project. Consumption during the period 89/02/02-89/03/24 is 40% less than consumption during the period 89/01/01-89/02/01. The corresponding reduction in peak 15-minute demand is about 30%.

| Energy Consumption | | | Peak Electric Demand | |
|---|---|---|---|---|
| Before | After | | Before | After |
| 7.8 | 4.7 | avg kW | 16.3 | 11.6 kW |
| 68 | 42 | MWh/yr | | |

**Building Total.** Figure 5 shows the weekly energy consumption totals and weekly peak 15-minute demands of Building 8030. Note that the substantial reductions in lighting consumption cannot be reliably estimated from the whole building data because the lighting reductions are masked by large variations in other loads within the building. For example, building total electrical consumption increased significantly during the time periods 89/07/17-89/08/09 and 89/12/13-90/01/10 when lighting consumption was constant or decreasing.

The consumption during the period 89/01/11-89/03/29 averages 216 kW or 1900 MWh/yr. The peak demand in January is 450 kW and about the same in February. These numbers are used to calculate the contributions to building total load that interior and exterior lighting represent.

**Economic Analysis**

The cost of an O&M program is hard to estimate but is usually assumed to be negligible because an O&M program does

not require additional labor or materials, only changes in existing procedures. It is therefore usually assumed that any O&M that saves money and energy is justified and a formal estimate of years to discounted payback is not required. We therefore estimate only the savings expected for the lighting conservation programs being evaluated in this test.

The installation is served by the Colorado Springs Department of Utilities. The monthly demand charge is $5.76/kW. The consumption charge is $0.0254/kWh. The supply cost adjustment varies monthly; it ranged between $0.0024 and $0.0048 per kWh and averaged $0.00332 per kWh in the fourth quarter of 1988.

**Interior Lighting.** Savings in consumption and demand charges resulting from the lighting awareness program are as follows:

| | kWh | kW | $ |
|---|---|---|---|
| Consumption: | 56300 | 0.0287 | 1615 |
| Demand: | 0.23 | 5.76*12 | 15 |
| Total: | | | 1630 |

**Exterior Lighting.** Savings in consumption and demand charges resulting from the exterior delamping program are as follows:

| | kWh | kW | $ |
|---|---|---|---|
| Consumption: | 25900 | 0.0287 | 745 |
| Demand: | 4.68 | 5.76*12 | 325 |
| Total: | | | 1070 |

**Recommendations and Conclusions**

It is clear from the lighting power monitoring results and the economic analysis that substantial savings are possible by delamping and occupant awareness. The annual savings that can be achieved in Building 8030 by having departing occupants turn out their lights is $1600/yr. This savings comes from a 60% reduction in lighting energy consumption. The reduction in peak demand was insignificant, as expected.

The annual savings that can be achieved by delamping of the exterior lighting system is $1100/yr. This savings comes from a 40% reduction in lighting energy consumption and a 40% reduction in peak lighting demand.

These figures indicate that a program involving all non-residential buildings on the base can result in substantial savings. Based on the BEPS energy use intensity numbers for electrical consumption in standard building categories and the building inventory reported in the Fort Carson Energy Consumption Report we conclude that lighting accounts for at

least 25% of Fort Carson's electrical consumption. Assuming that Building 8030 is representative of the interior/exterior lighting mix (70% interior lighting and 30% exterior lighting) and conservation potential for non-residential buildings, a basewide savings of 10% or $300,000 per year is possible.

Fort Lewis Testing

The testing at Fort Lewis was conducted during the period 16 July 1989 to 26 November 1989. The purpose of this test was to measure the electric demand profile of Fort Lewis and determine the relative contribution to that demand of each of the three substations and associated feeder lines. This information is then used to justify further monitoring or analysis to identify energy conservation opportunities.

**Test Description and Procedures**

Electrical use data (watts and power factor) were collected at 15 minute intervals over a period of approximately four months. The three electrical substations and associated feeders (Army South-4 feeders, Army Central-9 feeders, and Madigan-3 feeders) were monitored. The data were collected simultaneously to account for load shifts and to determine installation peak demand.

**Test Apparatus and Instrumentation**

Current and voltage transformers which had already been installed for the spinning-disk kWH meters were used together with four Synergistic C180 loggers to collect the data.

**Results**

The total hourly electrical demand for Fort Lewis is shown in Figures 6 to 8. Figure 1 shows a comparison of the average weekday folds for the months of July, September, and November. Figures 7 and 8 show daily folds for a representative month for a weekday and weekend, respectively. These figures and others with shaded areas (the "folded" figures) show the 95% confidence intervals for the data. The confidence intervals give a good indication of the range of data used in the calculation of the average (solid line).

These data indicate that the monthly load factor for the site averages approximately 1.45. Due to the similarity of profiles across different seasons, it appears that most of the electric loads are not temperature dependent and opportunities for electrical energy (kWh) cost savings probably exceed demand (kW) cost savings.

**Substation Profiles**

Figures 9, 10, and 11 show a comparison of average weekday

folds for the months of July, September, and November. These figures indicate that the demand profiles for each of the three substations shift horizontally and/or vertically on a monthly basis. For the tests shown, the total demand (both overall and peak) is greatest during the month of November. The time of peak demand for the months of September and November is approximately 0800 hours. However, the time of peak shifts to 1100 hours during the summer month of July. This may be the result of cooling loads which occur on a seasonal basis. The remaining figures show daily folds for a representative month for a weekday and weekend, respectively.

The data shows that during the time of peak demand, the demand profiles of the fort as well as the individual substations are relatively flat. As a consequence, there are limited opportunities for peak shaving--at least at the substation level. The Army Central substation appears to have the most potential for reducing the peak demand since it has the most pronounced peak and accounts for nearly 50% of the total fort demand.

The demand profile data for the 9 active feeders of the Army Central substation show peak demands for two of the feeders which coincide with the 0800 hours Army Central substation peak. Shifting the peak demands of these two feeders would likely reduce the overall peak of the substation but would not bring about a significant savings in demand charges. The Army Central substation peak is more accurately described as a bump on a hill and shaving off the bump will still leave most of the hill and the savings will not necessarily be substantial

The remaining feeders in the A series have daily profiles which either do not have pronounced peaks or have peaks which occur at times not coincident with the Army Central substation peak demand.

The demand profiles data for the four feeders of the Army South substation show daily demand profiles of these feeders are relatively flat and do not have dominant peaks. Also, the peaks which do occur do not always coincide with the peak demand time for the substation. As a consequence, it is difficult to identify areas of potential energy savings.

The demand profile data for the three feeders of the Madigan substation. show relatively flat peaks for one feeder (M1), and fairly well-defined peaks for feeders M2 and M3. Both M2 and M3 have daily demand profiles with shapes very similar to that of the Madigan substation. Since they account for approximately 95% of the total demand, the characteristics of these two feeders dominate the Madigan substation.

**Coincident Demand Determination**

One of the major issues to be examined in this study was the effect of combining the electrical demand from the three substations into a total coincident demand. This modification could potentially reduce the overall metered peak demand (and peak demand charges) of the fort. The magnitude by which demand is reduced depends upon the relative values of the peak demands of the three substations and the times they occur. Figures 12 to 14 show the total peak electric demand for Fort Lewis for the months of July, September, and November respectively. Each figure includes both the independent and concurrent demand calculations. The total independent demand calculation is made by determining the peak demand from each of the substations for the month and then summing them to get the total demand. The concurrent demand calculation is made by summing the demands from the three substations and using that sum to determine the overall peak demand for the month.

The figures indicate that there is a small difference between the two calculations for the data shown. For the test period of July through November, the two demand calculations differ by an average of approximately 700 kW (2.3%). The smallest differences occurred during the summer months of July and August (less than 500 kW). The largest differences occurred during the fall months of October and November (greater than 900 kW).

**Power Factor Determination**

Figures 15 to 18 show weekday folds of the power factors of Fort Lewis and the three substations. The daily profiles of the power factors for the fort (total), substations, and feeders were found to be fairly consistent from weekday to weekend as well as month to month. Thus, only a weekday fold from a representative month is shown for each. The figures also include the 95% confidence intervals to provide an indication of the variation around the average.

The data show that the power factors of 9 feeders of the Army Central are between 0.85 and 1.0. The data shows the power factors of the 4 feeders of the Army South substation differ significantly from 1.0. For the time period of testing, the power factors of these feeders range from approximately 0.7 to 0.9. The feeder S2 has the worst power factor with a minimum averaging near 0.70. The remaining feeders all have minimum power factors which fall in the range of 0.75 to 0.8.

The power factor data for the Madigan substation falls within the range of 0.8 to 0.9.

The results of this test can be summarized as follows.

The potential for reducing the peak demand at the substations and the site as a whole appears to be limited. This is mainly a result of the nature of the substation demand

profiles which is primarily driven by the type of activities at the site and the mild site climate.

- Combining the three substations and calculating the electric demand concurrently will reduce the peak demand by approximately 2.3%.

- The power factors of most of the feeders on the three substations fell in the acceptable range of 0.8 to 1.0. However several of the feeders had power factors significantly below 0.8. Investigation of the "end uses" for these feeders is needed to better understand the reasons for the low power factors.

**Economic Evaluation**

Electrical metering (kWh and kW) for utility billing purposes occurs at three substations: Army Central, Army South, and Madigan. The metered data indicate that approximately 70% of the monthly bill is for energy (kWh) charges and 30% for demand (kW) charges. The Army Central substation accounted for 53.3% of the total costs while the Army South and Madigan substations accounted for 34.1 and 12.6% of the total costs, respectively.

If metering for billing purposes were consolidated at a new single substation, data from the period 16 July to 26 November indicate that monthly savings in demand charges would range from $1488 to $2929 per month. Assuming comparable savings for the balance of the year, centralized metering for billing purposes would reduce annual electrical demand charges for the entire site by approximately $28,000/year. (Actual site demand would remain unchanged.)

**Recommendations and Conclusions**

It is clear from the demand monitoring data that there are only limited opportunities for savings by demand shifting or peak shaving. The majority of the savings appears to be in reducing the baseline energy usage (kWh) through cost-effective conservation programs.

Further examination (and identification) of the loads on individual feeders will help identify energy savings as well as power factor correction opportunities. This can be accomplished through targeted individual building metering. This information is useful for developing conservation programs by identifying where the largest savings potential could be achieved at the site.

ATTACHMENT 2

# STATUS OF PNL MAPS

## STATUS OF PNL MAPS

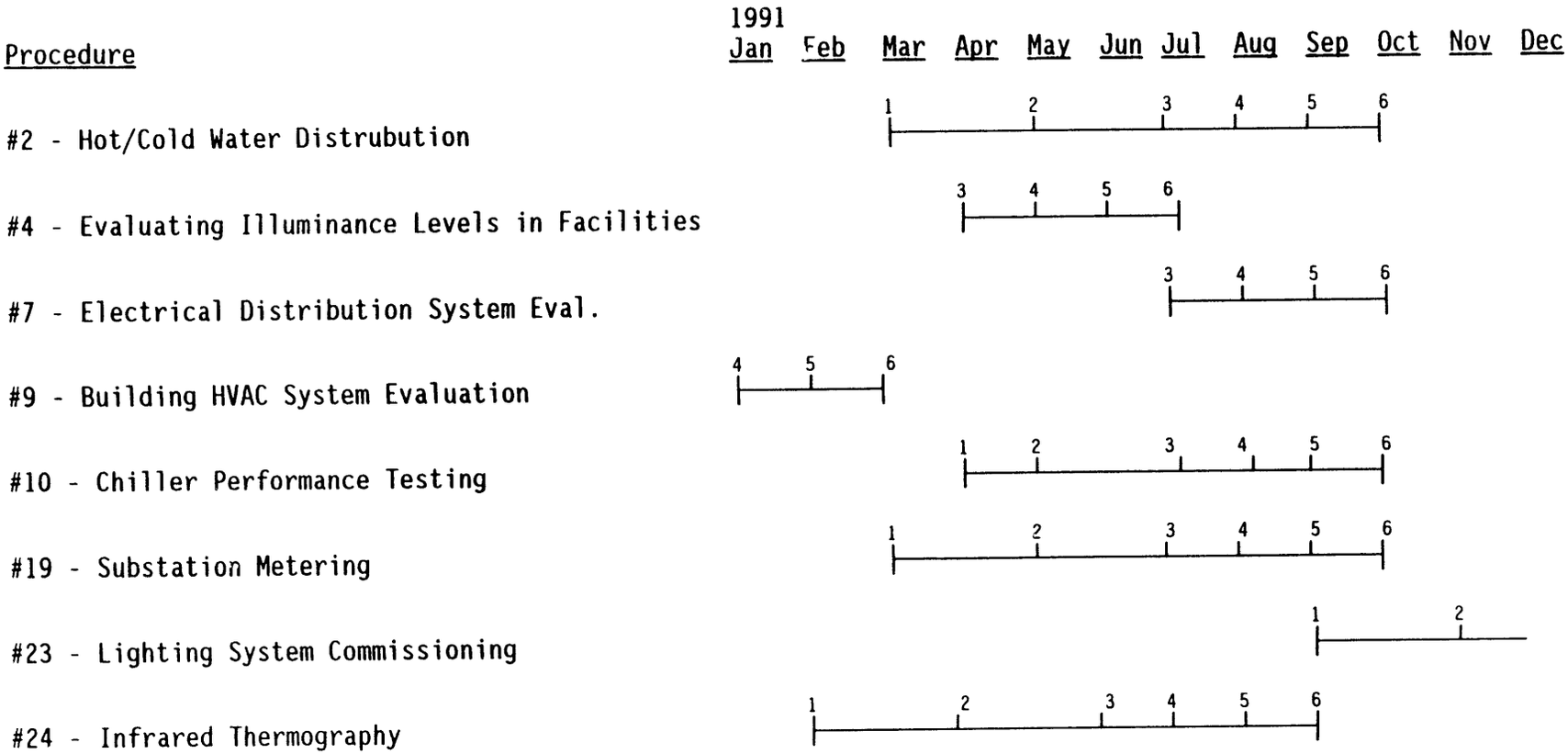
| MAP # | TEST DESCRIPTION | STATUS |
|---|---|---|
| **FORT CARSON** | | *[Initial Site Visit 01/89]* |
| CARSON-001 | Building 8030 Lighting and End Use Metering | Taking Data Until 06/91 (Report Written) |
| CARSON-002 | Combustion Efficiency/Waste Oil Burn | Equipment Remains 09/90 |
| CARSON-003 | Building 8000 Compressor Evaluation | Testing Completed 01/91 |
| **FORT LEWIS** | | *[Initial Site Visit 05/89]* |
| LEWIS-002 | Electrical Distribution System Profile | Equipment Removed 12/89 |
| LEWIS-003 | Sewage Treatment Plant Profile | Equipment Removed 12/89 |
| LEWIS-005 | Commissary Electric Usage Profile | Equipment Removed 12/89 |
| LEWIS-006-R1 | Steam & HTHW Usage Evaluation | Testing Completed 03/91 |
| LEWIS-007-R1 | Barracks Heat Demand | Testing Completed 03/91 |
| LEWIS-009 | Helicopter Simulation Building Tripout | Testing to Start 04/91 |
| **FORT SAM HOUSTON** | | *[Initial Site Visit 08/89]* |
| FSAMH-001 | Air Conditioner Controller Evaluation | Equipment Removed 08/89 |
| FSAMH-002 | Chiller Performance Evaluation | Testing Completed 10/90 |
| FSAMH-003 | Hot Water Controller Evaluation | Testing Deferred 10/90 |
| FSAMH-004 | Laundry Boiler Combustion Efficiency | Testing Deferred 10/90 |
| **FORT IRWIN** | | *[Initial Site Visit 09/89]* |
| IRWIN-001 | Electrical Distribution System Profile | Testing Completed 10/90 |
| IRWIN-002 | Office Building Electric Use Profile | Testing Completed 10/90 |
| IRWIN-003 | Office Building Lighting Levels | Testing Completed 12/89 |
| **HUNTER ARMY AIR FIELD** | | *[Initial Site Visit 10/89]* |
| HUNTR-001 | Electrical Distribution System Profile | Testing Completed 01/91 |
| HUNTR-002 | Chiller Performance Evaluation | Testing Completed 09/90 |
| **FORT STEWART** | | *[Initial Site Visit 10/89]* |
| STWRT-001-R1 | Electrical Distribution System Profile | Testing Completed 09/90 |
| STWRT-002-R1 | Main Power Plant Electric Use Profile | Taking Data Until 09/91 |
| **FORT MCPHERSON** | | *[Initial Site Visit 11/89]* |
| FTMAC-001 | Boiler Combustion/Delivery Efficiency | Equipment Removed 08/90 |
| FTMAC-002 | Building 200 Electric Profile | Equipment Removed 01/91 |
| FTMAC-003 | Combustion Efficiency Small Boilers | Equipment Removed 08/90 |

## STATUS OF PNL MAPS (cont.)

| | | | |
|---|---|---|---|
| **FORT GILLEM** | | *[Initial Site Visit 11/89]* | |
| FTGIL-001 | Warehouse Temperature Stratification | Testing Deferred | 02/91 |
| FTGIL-002 | Boiler Shutdown Evaluation | Testing Deferred | 02/91 |
| **FORT ORD** | | *[Initial Site Visit 04/90]* | |
| FTORD-001 | Peak Demand at PX and Meter Calibration | Test Not Needed | 12/90 |
| FTORD-002 | Well Water Pumps Electric Demand | Testing Deferred | 04/91 |
| FTORD-003 | Electrical Distribution System Profile | Testing Started | 12/90 |
| FTORD-004 | Hospital End Use Characterization | Testing Started | 12/90 |
| FTORD-005 | Hospital Boiler Delivery Efficiency | Testing Completed | 12/90 |
| **FORT RILEY** | | *[Initial Site Visit 07/90]* | |
| RILEY-001 | Electrical Distribution System Profile | Testing Deferred | 01/91 |
| RILEY-002 | Chiller Delivery Efficiency | Testing to Start | 08/91 |
| RILEY-003 | Chiller Cooling Load Determination | Testing to Start | 08/91 |
| **LAKE CITY ARMY AMMUNITION PLANT** | | *[Initial Site Visit 09/90]* | |
| LKCITY-001 | Measure Lighting Levels and Determine Lighitng Conservation Opportunities | Submitted to Site | 11/90 |
| LKCITY-002 | Measure Electrical Output and Condition of Backup Deisel Generators | Submitted to Site | 11/90 |
| LKCITY-003 | Measure Long-Term Seasonal Temperature and Humidity Levels in Charging Areas | Submitted to Site | 11/90 |
| LKCITY-004 | Verify Steam Delivery Efficiency and Independently Evaluate Steam Distribution System Upgrade Analysis | Submitted to Site | 11/90 |
| **MARINE CORPS BASE CAMP PENDLETON** | | | |
| PENDLT-001 | Baseline Profile of Electrical Distribution System | Submitted to Site | 01/91 |

ATTACHMENT 3

# SCHEDULE FOR TEST PROCEDURES




Key 1 = Initiate procedure writing
2 = Complete 1st Draft - submit to SAS for review
3 = Begin 2nd Draft
4 = Complete 2nd draft - submit for PNL review/clearance
5 = Publish final procedure
6 = Submit to standardizing society

April 1, 1991

# MEL PROCEDURE DEVELOPMENT

| PROCEDURE TITLE | STATUS | SCHEDULED COMP. DATE | STDS DATE |
|---|---|---|---|
| 01 Building Enduse Metering | Final completed | 02/91 - Final | 03/91 - ASTM |
| 02 Hot and Chilled Water Distribution System Evaluation | 1st draft under development<br>Field tested | 05/91 - SAS | |
| 03 Whole Building Performance Evaluation | On hold until MAP requirment | --- | |
| 04 Evaluating Illuminance Levels in Facilities | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | 06/91 - Final | 07/91 - IES |
| 05 New Building Commissioning | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | 12/91 - Final | |
| 06 Steam System Distribution Evaluation | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | 08/91 - Final | |
| 07 Electrical System Distribution Evaulation | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | 08/91 - Final | 10/91 - ASTM |
| 08 Boiler Efficiency Evaluation | 1st draft completed<br>Comments rcvd 2/2/90 and 3/21/90<br>2nd draft in progress | 06/91 - Final | |
| 09 Building HVAC System Evaulation | Final completed | 02/91 - Final | 03/31 - ASTM |
| 10 Chiller Performance Testing | 1st draft in progress<br>Field tested | 05/91 - SAS | 10/91 - ASTM |
| 11 Fuel Quality and Delivery Evaluation | On hold until MAP requirement | --- | |
| 13 Electric Pump and Motor Efficiency Testing | Preliminary draft completed | 08/91 - SAS | |
| 14 Electric Disturbance/Harmonics Analysis | Field testing underway | | |
| 15 Temperature Stratification Evaluction | On hold until MAP requirement | --- | |
| 16 Controller Evaluation | Outline developed | --- | |
| 17 Indoor Air Quality and Ventilation Measurement | Available in other PNL documentation | --- | |

April 1, 1991

# MEL PROCEDURE DEVELOPMENT

| PROCEDURE TITLE | STATUS | SCHEDULED COMP. DATE | STDS DATE |
|---|---|---|---|
| 18 Power Factor Determination | On hold until MAP requirment | --- | |
| 19 Substation Metering | 1st draft in progress | 05/91 - SAS | 10/91 - ASTM |
| 20 Power Reliability | On hold until MAP requirement | --- | |
| 22 System Grounding | On hold until MAP requirement | --- | |
| 23 Lighting System Commissioning | To be developed in Federal Lighting Initiative program | 11/91 - SAS | |
| 24 Infrared Thermography | 1st draft in progress | 04/91 - SAS | |



Key: SAS = Corps of Engineers Savannah District Review
ASTM = American Society of Testing and Materials
IES = Illumination Engineering Society
Final = Final document for PNL clearance process

ATTACHMENT 4

# STATUS OF PNL REPORTS

## STATUS OF PNL REPORTS

| REPORT # | REPORT TITLE | STATUS | |
|---|---|---|---|
| **FORT CARSON** | | | |
| CARSON-001 | Building 8030 Lighting and End Use Metering | Final to Site | 07/90 |
| CARSON-002 | Combustion Efficiency/Waste Oil Burn | Final to Site | 07/90 |
| CARSON-003 | Building 8000 Compressor Evaluation | Draft to SAS | 03/91 |
| **FORT LEWIS** | | | |
| LEWIS-002 | Electrical Distribution System Profile | Final to SAS | 11/90 |
| LEWIS-003 | Sewage Treatment Plant Profile | Draft to SAS | 04/91 |
| LEWIS-005 | Commissary Electric Usage Profile | Final to SAS | 10/90 |
| LEWIS-006-R1 | Steam & HTHW Boiler Testing | Start Data Anal. | 04/91 |
| LEWIS-007-R1 | Barracks Heat Demand | Start Data Anal. | 04/91 |
| LEWIS-009 | Helicopter Simulation Building Tripout | Testing to Start | 04/91 |
| | Ft. Lewis Electric Energy Baseline and Efficiency Resource Assessment | Final to FEMP | 04/91 |
| **FORT SAM HOUSTON** | | | |
| FTSAM-001 | Air Conditioner Controller Evaluation | Accepted by Site | 07/90 |
| FSAMH-002 | Chiller Performance Evaluation | Start Data Anal. | 11/90 |
| FSAMH-003 | Hot Water Controller Evaluation | Testing Deferred | 09/90 |
| FSAMH-004 | Laundry Boiler Delivery Efficiency | Testing Deferred | 09/90 |
| **FORT IRWIN** | | | |
| IRWIN-001 | Electrical Distribution System Profile | Draft to SAS | 04/91 |
| IRWIN-002 | Office Building Electric Use Profile | Start Data Anal. | 02/91 |
| IRWIN-003 | Measured Lighting Levels in Four Office Buildings | Final to SAS | 08/90 |
| **HUNTER ARMY AIR FIELD** | | | |
| HUNTR-001 | Electrical Distribution System Profile | Start Data Anal. | 01/91 |
| HUNTR-002 | Chiller Performance Evaluation | Start Data Anal. | 11/90 |
| **FORT STEWART** | | | |
| STWRT-001-R1 | Electrical Distribution System Profile | Draft to SAS | 04/91 |
| STWRT-002-R1 | Main Power Plant Electric Use Profile | Start Data Anal. | 10/91 |
| **FORT MCPHERSON** | | | |
| FTMAC-001 | Boiler Combustion/Delivery Efficiency | Final to SAS | 10/90 |
| FTMAC-002 | Building 200 Electrical Profile | Draft to SAS | 04/91 |
| FTMAC-003 | Combustion Efficiency Small Boilers | Final to SAS | 10/90 |
| | Feasibility Analysis for a Shared Energy Savings Lighting Retrofit at Ft. McPherson | Final to FEMP | 02/91 |

## STATUS OF PNL TEST REPORTS (cont.)

| | | | |
|---|---|---|---|
| **FORT GILLEM** | | | |
| FTGIL-001 | Warehouse Temperature Stratification | Testing Deferred | 02/91 |
| FTGIL-002 | Boiler Shutdown Evaluation | Testing Deferred | 02/91 |
| **FORT ORD** | | Site Visit Report | 04/90 |
| FTORD-001 | Peak Demand at PX and Meter Calibration | Test Not Needed | 12/90 |
| FTORD-002 | Well Water Pumps Electric Demand | Testing Deffered | 04/91 |
| FTORD-003 | Electrical Distribution System Profile | Testing Started | 12/90 |
| FTORD-004 | Hospital End Use Characterization | Testing Started | 12/90 |
| FTORD-005 | Hospital Boiler Delivery Efficiency | Start Data Anal. | 02/91 |
| **FORT RILEY** | | Site Visit Report | 07/90 |
| RILEY-001 | Electrical Distribution System Profile | Testing Deferred | 02/91 |
| RILEY-002 | Chiller Delivery Efficiency | Testing to Start | 08/91 |
| RILEY-003 | Chiller Cooling Load Determination | Testing to Start | 08/91 |
| **LAKE CITY ARMY AMMUNITION PLANT** | | | |
| | Temperature/Humidity Study in Buildings #3 and #65 Charging Wings | Final to Site | 12/90 |
| **NATIONAL NAVAL MEDICAL CENTER** | | | |
| | Energy Use Baselining Study for the National Naval Medical Center | Draft to Site | 03/91 |
| **MARITIME ADMINISTRATION/MERCHANT MARINE ACADEMY** | | | |
| | U.S. Maritime Administration Merchant Marine Academy Monitoring to Support a Shared Energy Savings Procurement | Draft to Site | 04/91 |

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